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# College Board Review

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The College Entrance Examination Board is composed of 205 member colleges and 34 member associations. Each member college has two representatives on the Board. Member associations have from one to six representatives. Members and their representatives are listed in the *Report of the President*. Meetings of the Board are held on the last Wednesday in October.

Illustrations: pp. 3, 5, 6, 8-10, 17, 19, 21, 22, Wyatt; pp. 4, 14, Warman; p. 7, Higgins; p. 12, Shapiro; p. 18, University of Michigan; p. 25, Fabian Bachrach; pp. 27-31, Malta; p. 32, Kersh of Ottawa.

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## **College Board Review**

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Cover: Coins fuel the lamp of learning in this design by Dan Shapiro on the theme of "Finance"; coin and its consequences similarly glint in articles within, its lack figuring heavily in the background of the first and its effects on admissions and on total college policy in the two last contributions. Elsewhere the clink of coin is muted where not wholly stilled, with authors reckoning value in different but perhaps no less compelling currencies.

## NEWS OF THE COLLEGE BOARD

### Board members to meet

**Nine regional groups:** Plans for nine regional meetings of College Board member colleges during the remainder of the current academic year had been completed at the time this issue of the *Review* went to press. Although the programs of the meetings will vary, depending upon the principal interests of the groups, all will include discussion of the Board's foreseeable plans and problems, most of them by both school and college representatives.

The topics related to College Board activities and affairs will include score interpretation, finances, membership policy, and the work of the Commission on Mathematics (see page 7). Among other subjects of interest to Board members will be the progress of the Advanced Placement Program and the possibility of ameliorating the multiple application problem through a plan which would match candidate and college choices.

**Scheduled meetings:** The dates, regions, sites, and chairmen of the scheduled meetings are as follows: February 17-18, South, Atlanta, Ga., James D. Farrar, assistant dean, Washington and Lee University; March 4, Southern New England, Yale University, Arthur Howe, Jr., dean of admissions and student appointment, Yale; March 18-19, Northern New England, Boston University, Donald L. Oliver, director of admissions, Boston University; March 21-22, Midwest, University of Chicago, Charles D. O'Connell, Jr., director of admissions, University of Chicago, and Robert D. Amaden, director of admissions, Lake Forest College; March 25-26, Metropolitan New York, New York University, Thomas P. Robinson, director of admission, New York University; April 1, Eastern Pennsylvania, Princeton University, C. William Edwards, director of admis-

sion, Princeton; April 14, Western Pennsylvania, Carnegie Institute of Technology, John M. Daniels, chairman of admissions, Carnegie; April 15-16, Upstate New York, Syracuse University, John S. Hafer, dean of admissions, Syracuse; June 17-18, West Coast, San Francisco, Douglas V. McClane, director of admissions and freshmen counseling, Whitman College.

**Special programs:** Among the additional features planned by the chairmen of some of the meetings will be the southern group's discussion of the scholarship agreement observed by 11 colleges of the region, which is to be presented by Ben F. Cameron, Jr., director of admissions of the University of the South, and a panel discussion on the use of tests in admissions. The meeting at Yale will devote an afternoon panel discussion by Dr. Bryant M. Wedge of Yale and David R. Saunders of the Educational Testing Service to the topic of nonintellectual factors affecting success in college and an evening period to an address on "Trends in Preprofessional Education" by Eugene V. Rostow, dean of the Yale Law School. The group assembling at Princeton will be addressed at luncheon by Henry Chauncey, president of the Educational Testing Service.

### SQT continued

**October 21 date set:** The Scholarship Qualifying Test, taken by a total of almost 425,000 candidates in its 1956 and 1957 administrations, will be offered by the College Board on October 21 this year, as reported in the last issue of the *Review*. Although it is expected that the number of candidates will be substantially reduced as a result of National Merit Scholarship Corporation's recent decision to require a different and earlier test, the Board will provide the SQT in 1958 in

behalf of other scholarship sponsors and educational agencies.

### Score release aids planned

**Subcommittee to meet:** A subcommittee on test interpretation has been appointed to consider the materials which the College Board will provide schools and colleges to assist them in interpreting the Scholastic Aptitude Test and Achievement Test scores of their students. Appointment of the subcommittee followed the Board's decision in October to permit the disclosure of scores to students by their schools and colleges beginning with the tests administered in December 1958.

Members of the subcommittee, which will meet on March 11, are G. Grenville Benedict, dean of students, Phillips Academy, Andover, Mass., chairman; Helen Brickell, educational counselor, Bronxville Senior School, Bronxville, N. Y.; Warren G. Findley, assistant superintendent for pupil personnel services, Board of Education, Atlanta, Ga.; Ann Splitstone, director of admission, Hollins College; Emery R. Walker, Jr., dean of admission, Claremont Men's College; Richard W. Willard, statistical analyst, office of admissions, Massachusetts Institute of Technology; Harold Zuckerman, coordinator of college guidance, Board of Education, New York, N. Y.; and Morris Meister, president, Bronx Community College, ex officio.

### Candidates Reply Date

**May 21:** Colleges which will observe the May 21 Candidates Reply Date for 1958, the earliest date by which participating colleges can ask candidates to reply to notifications of admission or financial aid offers, are indicated in the list of College Board member institutions on page 33.



## COLLEGE BOARD RESEARCH NOTES

### SQT, SAT scores compared

**Find high correlations:** Because the Scholarship Qualifying Test is frequently used by scholarship sponsors as a screening test to determine which applicants will take the Scholastic Aptitude Test, the relationship between the two tests is extremely important. The efficiency of the SQT as a screening device depends on the extent to which it yields scores that have a high correlation with the final SAT scores that are considered by sponsors in making their awards.

Richard S. Levine of the Educational Testing Service has just completed a study of this relationship; based on a random sample of 720 students who were tested on both examinations. The correlations between the two parts of the SQT and similar sections of the SAT proved to be very high, the SAT-V and the SQT-V showing a correlation of .85 and the SAT-M and the SQT-M a correlation of .81.

**"Underachievers" favored:** In considering what errors would occur in predicting SAT scores from SQT scores, Dr. Levine's study reveals that the more serious errors of prediction would involve relative "underachievers" on the SAT (in other words, students whose SAT scores are lower than the scores that would have been predicted from their SQT scores). This implies that errors in screening based on SQT scores tend to be lenient—that is, to encourage slightly more candidates to take the SAT than are likely to obtain high scores on it.

### Research review issued

**Covers five-year period:** A mimeographed report entitled, "Research Activities of the College Entrance Examination Board (1952-1957)," is now available. The new volume covers over

200 studies supported or conducted by the College Board.

Copies may be obtained by writing the Director of Research, College Entrance Examination Board, 425 West 117 Street, New York 27, N. Y.

### SAT coaching studied

**Duplicated coaching "schools":** Early in 1957 a third attempt to estimate the "coachability" of the Scholastic Aptitude Test—that is, the extent to which scores on the test may be increased by special drills—was announced in the *College Board Review*, No. 31. This study, conducted by Robert E. Dear of the Educational Testing Service, has now been completed. Its findings are in basic agreement with the two previous coaching studies conducted for the Board.<sup>1</sup>

The most recent coaching study differed from the previous two in a number of important respects. It attempted to duplicate, insofar as possible, the conditions under which "coaching schools" that purport to improve a student's preparation for the SAT actually operate.

The students who participated in the experiment all volunteered for coaching. (In this way an attempt was made to duplicate the motivation and interest which students have when they take a coaching course.) Half the volunteers were notified that they could not be accommodated in the coaching courses because of limited facilities. This motivated-but-uncoached group later served as a control group in evaluating the effectiveness of coaching with respect to raising SAT scores. A second control group was also set up consisting of uncoached students in another group of schools where no

coaching courses were offered. The three student groups were seniors in public and private secondary schools.

The coaching received by the experimental subjects was more intensive than that attempted in either of the two earlier studies.

**Authentic materials used:** The study materials were especially prepared for the purposes of the experiment and consisted of verbal and mathematical items very similar to those used in current SAT forms. The secondary school teachers who participated in the study as "coaches" were given a special orientation course.

All students who were involved in the experiment had previously taken the SAT as preliminary candidates, in their junior year. These earlier scores provided a measure of initial ability on the basis of which any subsequent gains in score could be compared. Their senior-year SAT scores were then obtained in March, after the coached group had received more than four months' intensive coaching.

**Score gains negligible:** Analyses of the data obtained after the March administration revealed that on the verbal section of the SAT, the coached group did not perform any differently than either the motivated but uncoached control group or the unmotivated and uncoached control group. However, in the case of the mathematical section, the coached group did obtain a higher average than did either of the uncoached groups. Even here the difference in favor of the coached group was too small to be of any significance in college admissions decisions. While it may be advisable for students not taking any mathematics courses in the year they take the SAT to spend a little time reviewing their previous mathematics courses, this does not seem to be clearly beneficial.

<sup>1</sup> Henry S. Dyer, "Does coaching help?" *College Board Review*, No. 19, page 331; John W. French, "An answer to test coaching," *ibid.*, No. 27, page 5.



## In search of "nonexistent" talent

Project in New York City school seeks potentially talented among the underprivileged through enriched program and activities

All talent-searching may be divided into three kinds: the first, which is most important but least discussed, is the search for talent that is not lost; the second, which is least important but discussed most, is the search for talent which has gone unnoticed; and the third, which is the most interesting, is the search for talent that, given current educational practices, does not seem to exist.

The search for talent that has never been lost is the educational process itself, enduring throughout the childhood years, involving thousands of hours of direct observation and countless examinations, oral and written. This is the classic method of identifying talent. In a society that could still believe that virtue is invariably rewarded, or that was willing to accept the inefficiencies of a modestly maintained school system, this method would be enough—especially since its failures are accompanied by a low tax rate.

But a society startled by a show of strength from its enemies, and resolved to develop its resources of talent to the utmost but unwilling to pay the price for refurbishing its educational systems, is apt to turn toward some apparently easy method for discovering talented youth full-grown or capable of rapid development at little expense or trouble. In such circumstances the second kind of talent search may be asked to provide the saving miracle. It will not.

The second kind, the search for talent that has gone unnoticed, is the mass testing program. Such programs have their uses, but in the end they turn back upon the educational establishment the same burdensome, expensive jobs of talent development that

have existed from the beginning. As a minor part of the educational process, testing is a powerful, almost essential tool but it is not inexpensive, for it invariably uncovers the need for added services.

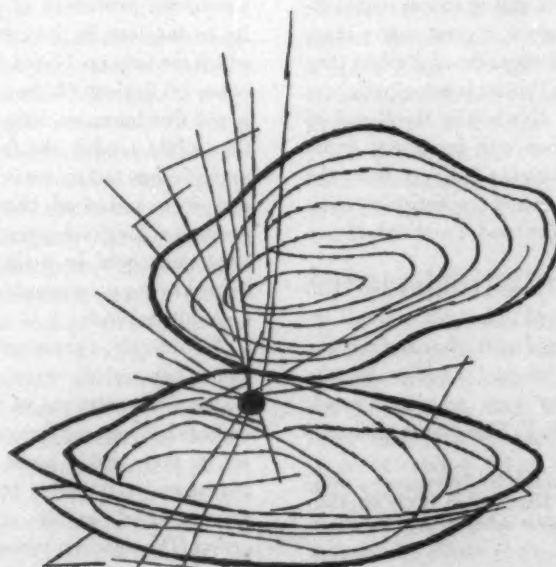
When attached to scholarship funds and conducted from outside the school a testing program helps dramatize the need for financial assistance to students and provides a check against national standards of the talent identification made by the school. This, however, is talent *certification*, not identification in any real sense. The boy known to be the brightest in town is shown to be merely third brightest in the state.

Occasionally a testing program does actually identify a talented youth. This is possible when a dozen or so teachers and auxiliary personnel have for eight or 10 years failed to notice what is under their noses—and, in fact, have failed to use tests themselves or have mis-

understood the results. Such instances are not rare enough to be amusing, but neither are they sufficiently numerous to save us from the Russians.

When talent is not discovered by either the first or second methods, that is, when it is not apparent to trained observers in the normal educational process as now established and is not registered by psychological tests, it may be said not to exist. The search for this talent is the most exciting of all, but it is not for the fastidious or the miserly. It is conducted along the back alleys among the frankly primitive or up into the low-cost public apartments where a little space can be bought and kept by a careful travesty of middle-class manners.

This kind of hunt can be called research in the behavioral sciences, but mainly it is for a nineteenth-century kind of man who either greatly loves or greatly loathes the poor, who believes that cleanliness, nourishment, and learning can make men happy, and who never bothers with quibbles about imposing values upon others. This kind of search has practically nothing



to do with the Russians; those who would raise up the child in the service of the State are more profitably employed elsewhere. At root it is a matter of saving souls.

Curiously enough, the College Board is involved in such a quest.

This new venture, called here "Project 43,"<sup>1</sup> began when a commission of the New York City Board of Education, working to increase integration of the races in the public schools, observed that one of the basic difficulties of minority group children lies not so much in circumstances peculiar to their race, but in the fact of their poverty and their position outside the dominant culture. Living in the slums, often or usually in broken homes, these children not only are barred from the cultural opportunities which are the normal furnishings of the middle-class home, but are barred from any knowledge of or aspiration toward those forms of living which accompany advanced education and vocational skill of a high order. The schools of the city, like those of most cities, are perhaps adequate for the needs of children who are strongly supported by the home and community environment, but under present arrangements for support they cannot begin to cope with the extreme needs of the culturally deprived child.

#### *College Board a sponsor*

Project 43 was created to demonstrate that the culturally deprived population of a large city could, under vastly increased but still practical school direction, produce a great many more talented and educable adults than they do now. The Project is principally supported and directed by the Board of Education but with important financial and planning support from the College Board and the National Scholarship Service and Fund for Negro Students.

Project 43 began in September 1956 and is planned to last six years. It involves three classes chosen from the seventh, eighth, and ninth grades of a single junior high school, P.S. 43, New York, N. Y. These three groups of

children will be provided with educational, guidance, and cultural experiences far in excess of anything normally included in the junior high school program. As the pupils move through the junior and senior high schools they will be closely observed and every effort will be made to remedy educational deficiencies, to uncover talent masked by early deprivation, and to raise appropriately the level of aspiration.

The junior high school selected for the experiment has a devoted faculty and administration and a good program within the resources allowed it. Its pupils are approximately 48 per cent Negro, 40 per cent Puerto Rican, and 12 per cent White, with a few Orientals. The student population of 1,400 is drawn from a school district in which poverty is commonplace. In recent years only about half the graduates of the school have subsequently completed a senior high school program, and 10 per cent or less have gone on to some kind of post-secondary school education, with not more than 7 per cent entering a college liberal arts program.

It was apparent from the beginning that neither the resources of the project nor good educational sense would dictate the inclusion of the entire student body in the experimental classes. It was decided, though, that in selecting students, all errors should be errors of inclusion rather than of exclusion.

It is well known that conventional psychological tests have cultural bias. This bias may be an advantage for short-term prediction of pupils' ability to function in the culture toward which the tests are biased. For the purposes of Project 43, however, it was hoped that intensive, long-term education might modify the factors which made for low test scores in some cases, and it was desired that pupils of "promise" for development under such treatment could be included without regard to the poor prognosis given by conventional tests.

Accordingly, a great variety of tests, some non-verbal, were given, and teachers' observations of pupils were collected. Wherever there was any reason to hope that a pupil might later bloom under intensive treatment, he was included in the experimental group. The selection procedures final-

ly yielded experimental groups totaling 334 boys and 383 girls distributed approximately equally among the three grades. Provision was made for easy movement either into or out of the experimental groups as experience with pupils proved that such movement was desirable.

#### *Guidance—for parents, too*

Project 43 attempts to supplement the usual programs in guidance, remedial education, work with the home, and cultural activities. The professional counselor ratio to pupils has been reduced from 1 to 2,000 to 1 to 350, leaving a heavy but manageable counseling load. A social worker has been employed for one and one-half days per week. Remedial teachers in reading, mathematics, and foreign languages have been provided. A psychologist has been assigned for one and one-half days per week in the Project, and some clerical assistance has been added. In addition, an attempt has been made, with some initial success, to enlist the assistance of neighborhood service organizations.

The guidance program in the junior high school has allowed for at least one individual interview per child during the first year and for more than one such interview for many. In addition, group guidance activities aimed at raising the level of aspiration and encouraging self-evaluation by the pupils has been established.

One of the greatest needs has been for remedial teaching, especially in reading and arithmetic. Many of the pupils in the experimental group are retarded and need close and intensive instruction. In addition to the remedial program of the regular year, a summer school for remedial reading was



S. A. Kendrick, Vice President, Examinations and Research, of the College Board, is a member of the "Project 43" planning committee.

<sup>1</sup>The official title is "Demonstration Guidance Project." Some parents in the neighborhood seem to be using "Operation Talent Search."



established for those pupils who wished it. During the year, the school increased its efforts, already very substantial, to encourage informal reading among the pupils. Books were obtained at substantial discounts and a program of encouragement and reward for outside reading became a regular part of the school's activities.

It was recognized from the beginning that the education of parents would be one of the most important potential sources of improvement in the pupils. During the first year a series of parent workshops were held in the school, and a number of home visits were made by the social worker and the teachers. Not all parents were reached, of course, although it is hoped that during the second year of the program those who have persistently remained outside the project can be reached. Work with parents, like that with pupils, has included attempts to have the family evaluate the child's abilities and aim at maximum development of them.

#### *From Shakespeare to Hyde Park*

The program aimed at augmenting the cultural experiences of the children has been carried on largely during weekends with a great deal of volunteer work from the school's regular faculty. Students have gone to a wide variety of places outside their normal experience. (The peak of the year was undoubtedly reached when a group attended a Princeton football game.) These cultural activities are offered in addition to a very substantial regular program in the school. Visits to plays, museums, and concerts are regularly both preceded and followed by class discussion and written reports.

In a typical school year, these diverse extra cultural activities included trips by some 30 students to see the films "Fantasia" and "Secrets of Life"; by 70 and 43 students, respectively, to the Broadway plays "The Diary of Anne Frank" and "Inherit the Wind"; by 200 and by seven students, respectively, to the off-Broadway plays "Me, Candido" and "Take a Giant Step." Some 40 pupils saw Shakespeare's "The Taming of the Shrew"; 25 saw a series of five Gilbert and Sullivan operettas.

Classical music received much at-



Activities outside their normal experience

tention; 300 students were present at a series of five Saturday Young People's Concerts of the New York Philharmonic, 40 went to a special Tuesday Philharmonic Concert, 450 heard the New York City Symphony Orchestra in their school auditorium, 15 saw the opera "Don Carlos" and 70 saw "Tosca" performed at the Metropolitan, and 20 attended a Villa-Lobos concert at Carnegie Hall.

Other special activities of the year included a José Greco dance recital attended by 20 students, and visits by groups of 35 to the Metropolitan Museum and the Museum of Modern Art. Seventy students went to a Madison Square Garden basketball game; another 70, to a Town Hall lecture on Albert Schweitzer; and 30, to the Roosevelt memorial at Hyde Park. In assembly programs at the school, the students saw Shaw's "Man of Destiny" and heard a book talk and a lecture on anthropology.

In the senior high school the program has, of course, just begun, for it was in September 1957 that the original ninth-grade experimental group moved into the tenth grade. Plans for the first year in the senior high school will be focused very heavily on teaching. The students will be given a double English period and will take biology, mathematics, and a foreign language, as well as elective art and music.

The principal innovation in the senior high school will be drastic reduction in the usual class size for the experimental groups. English classes will have 13 pupils each, language classes 15, mathematics 12 to 15 for algebra and 10 students per class for

geometry. Pupils who cannot master plane geometry at this time will be given "intuitional geometry" in an attempt to gauge their eventual readiness to undertake the usual mathematics.

Guidance activities are, of course, continuing in the senior high school as is a very elaborate program of testing. However, college guidance in any real sense will be postponed until some time after the first year when the response of the group to the program will begin to be seen. It is expected that there may be very heavy losses from the program during the first year in the senior high school, especially for the ninth-grade group which moves to George Washington High School, New York, N. Y., with only one year of the Project behind them.

Two crisis points in the program may already be anticipated, one when the pupils reach school-leaving age and another at the end of the senior high school years. As students reach age 16, pressure to leave school and contribute to self-support and family income may be severe. The Project staff hopes to give the pupils and their families an understanding of the importance of deferring immediate income for the long-term advantages of further education. In addition, concrete assistance in finding suitable part-time employment or even in direct financial assistance will be needed.

At the end of the senior high school program, it seems inevitable that many of these pupils will need heavy financial assistance to attend college. Few of them will be able to compete successfully for scholarships unless their special circumstances are taken into account. It may, in fact, be necessary for admissions officers to accept minor irregularities in the high school program. It is hoped that the colleges will want to take part in the experiment when the time comes.

#### *Excites neighborhood interest*

No valid evaluation of this program can possibly be undertaken at the present time. When the six years are over, it will be possible to see whether these three classes have aspired to and achieved higher educational goals than have the classes before them. It should be possible to make some estimate of the effects of the program on



the neighborhood and upon other children who were not included in the project. It is already apparent that junior high schools in districts contiguous to the Project district are sending a disproportionate number of their pupils to the academic program at George Washington High School this year, apparently in response to the excitement generated over Project 43.

#### *May benefit thousands*

It is inevitable that a great number of disappointments will occur. The Project is very real; it is in no sense rigged to take advantage of the inevitable occurrence of a few extraordinarily bright children in any kind of neighborhood or population. About two-thirds of the Project pupils entering George Washington this year had IQ's measuring below 100 and a great number were retarded in reading and arithmetic. A good number of these test scores will turn out to be accurate forecasts of later achievement, no matter how stimulating the teaching provided. There is no present method of determining with any accuracy just which pupils, if any, are merely deprived rather than grossly untalented. The Project is based upon a conviction of the inadequacy of existing methods of talent identification rather than upon knowledge of any new and better methods.

Since the purpose of Project 43 is to demonstrate what might be done if adequate support were provided in "difficult" schools, any improvement

in the lot of these few hundred particular pupils will be welcomed not so much for the few individuals benefited as for the thousands of others who may later receive similar help if the public can be persuaded by the results of the Project to pay the costs of other such programs as regular educational policy.

Fortunately, the demonstration will not need to depend solely upon this one Project. With a grant from the Old Dominion Foundation, the National Scholarship Service and Fund for Negro Students has recently created a new organization, Community Talent Search, for the purpose of stimulating the development of similar projects in other cities. Already study of the Project 43 model has been undertaken by at least a dozen other cities. It now seems certain that a number of adaptations of the Project will be started in various places well before the New York venture is completed.

Project 43 involves risks. It is inevitable that those in charge of its execution will in some few cases at least hope too much for some of their charges. It may always be impossible to know how many families, only dimly aware of the demands of professional careers, will view as failure the real but limited gains of their children. It is difficult, though, to worry too much about the unrealistic ambitions which the Project may stimulate when the consequences of the present arrangement are seen as so utterly intolerable.

Neither can anyone be sure just what the effect will be if adolescents revise their view of the possible world so drastically as to tear themselves from the context of the family. There is enough rejection and conflict in usual adolescence; a deliberate effort to discredit, as it were, the view and form of life provided by the parents is not an undertaking which can be pursued without some concern.

The junior high school years are barely early enough to challenge the standards of the neighborhood. A few years later would probably place the pupil beyond reach of the school. As it is, the possible alienation of the pupil from the standards of his peers adds to the perils of this kind of meddling.

It should be possible to arrange for

programs like Project 43 without violence to the obligation of the school toward all its pupils. This venture involves, however, something more than the usual program of the comprehensive school. Probably it is impossible to conceal from those students not included that they are not hoped-for in quite the same way as are some classmates—often those who are no more worthy. No one can yet say that this will be an unimportant influence upon the effectiveness of the school.

#### *Wrenching talent free*

Finally, if it is successful, Project 43 will surely lead to unimaginative and inadequate emulation as well as to valid adaptations. The forces at work in such a project are only partially understood. One can, for example, imagine that a farm population might respond quite differently to external intervention in family affairs than does a city group for whom the welfare check and the welfare worker have ever been inextricably linked.

But when all this has been said, the risks seem slight compared to the possible gains both in lives altered and new knowledge produced.

Project 43 is new only in the sense that few things so single-minded have been tried before. No really new techniques or novel theories are involved. The schools concerned are actually not substantially different from the normal "good" school that any competent educationist would specify for the neighborhood involved. Care has been taken not to design a Utopian program beyond the means of a reasonably determined public. At stake is merely a definition of how much it matters that the nation do what it can.

For the College Board, the Project is a necessary complement to the Advanced Placement Program. If the needs of the plainly gifted must be met—and they must—so must encrusted talent be wrenched from the environment that will not let it emerge. Whether they will or not, pupils whose tastes are gross when they could be fine, whose accomplishments are mean when they could be large, and whose ability to choose a future for themselves is restricted by an ignorance of the variety of the world, must be given what they will not demand.



Aspiration toward skills of high order

## Mathematics for today

Commission is outlining how modern mathematics can replace present "seventeenth-century" programs in the schools

Some four years ago the College Board's Committee on Examinations was somewhat startled to receive a report from the Examiners in Mathematics which stated in effect that all was not well with the secondary school curriculum in mathematics in general and with coverage of the Board's Advanced Mathematics Test in particular.

Conferences with the examiners disclosed that they were quite unhappy with the requirement that the test for students in the fourth year of secondary school mathematics consist of approximately equal measures of questions in advanced algebra, solid geometry, and trigonometry. They felt that a test so described made it impossible to recognize properly the more modern kind of course that some schools had established, but more important, that the curriculum being tested was not the best curriculum that could be taught in American college preparatory high school programs.

From this discussion emerged the idea of setting up a commission of school and college teachers of mathematics to examine the existing college preparatory curriculum with a view to making recommendations for its improvement. Although commissions had been used for similar purposes with some frequency in the early days of the College Board, there were some misgivings at first as to the propriety of the idea. Eventually, however, the view prevailed that the modernization of an outmoded curriculum—the allegation made about the traditional high school curriculum in mathematics—was a matter of serious import for schools and colleges and therefore a proper subject for Board concern.

On a snowy day in February 1955, a small group of persons well ac-

quainted with mathematics teaching in school and college met with the Director of the Board (now the President) to suggest the names of appropriate persons for appointment to the commission. Thereafter it speedily became apparent, as various nominees were approached, that there was in the mathematical community a general belief in the desirability of curricular review by such a commission, and a feeling that its appointment had come none too soon. And on a hot day in August 1955, in Ann Arbor, Michigan, the Commission on Mathematics of the College Board organized for work.

### *Diverse views represented*

Work is certainly the word. The time and effort invested in Commission business by its busy and distinguished members is beyond calculation. Six two-day meetings have been held since that initial organization session, but all of these have required many hours of homework—both in prospect and retrospect.

Probably at least as much of the material from their working papers as will ever see publication has been discarded or revised. The report of the Commission, when completed, will certainly not be a compilation of the off-hand judgments of a handful of mathematicians intent on marketing their own pet ideas. No critic of the Commission, friendly or unfriendly, can ever be as outspoken as the Commission members have been with each other.

This does not mean, however, that meetings of the Commission have been acrimonious, or that the recommendations of the Commission are compromises watered down to satisfy conflicting points of view. The astonishing

thing has been the unanimity that promptly developed among so diverse a group, representing public and independent colleges and universities; liberal arts colleges, technological institutes, and teachers colleges; public and independent schools; large and small institutions.

What then are the principles that have guided the Commission in the acceptance or rejection of proposals it has considered? Simply stated, the overriding objective has been to formulate a secondary school mathematics curriculum oriented to the manifold needs of the second half of the twentieth century.

But there is a practical consideration, too, that must not be disregarded. It does little good to formulate a curriculum so oriented, if it is so strange that teachers are unfamiliar with the content and unable or unwilling to teach it. Therefore, not only must the new curriculum be oriented to the needs of the present and the foreseeable future; it must also be based on the traditional subject matter of secondary mathematics—algebra, geometry, trigonometry—and be a modification of, rather than an outright substitution for, the existing curriculum. At least, it must have these characteristics if it is to be widely introduced in the schools of America.



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In order to formulate a curriculum oriented to the needs of the second half of the twentieth century, the Commission had to ask what these needs were. It takes no narrow view here; it is interested in the needs of mathemat-



ics itself, of course, but it is also interested in the needs of the users of mathematics, and in the applications of mathematics.

This may properly be stated also in reverse: the Commission is not interested in mathematics only as the language of science; it is also interested in mathematics as a cardinal intellectual activity of the human mind, and determined that in its program there shall be a place for the sheer intellectual joy of solving a hard problem or the discovery by the student of something new, at least new to him.

The Commission has generally based its work on the following observations. First, in the past generation the nature of mathematics as a subject has been substantially altered by the results of mathematical research. The Commission points out that certain graduate courses, as for example a first graduate-level course in algebra, today have nothing in common but the title with similar courses offered in the 1920's. New concepts have been introduced that have revolutionized and transformed the subject.

### *Burgeoning fields*

It points out, too, that whole fields of mathematics (as for example, mathematical logic and mathematical statistics), which a generation ago were considered more or less esoteric specialties with a restricted literature studied by only a few interested students, have burgeoned to such an extent that specialized research journals limited to these fields are published, and have become so central in mathematical thought that every mathemat-

ician is expected as a matter of course to be familiar with at least the elements of these fields.

Mathematics has shown quite as much research dynamism as has chemistry, physics, or biology. The layman knows that these subjects have been transformed: chemistry has given him plastics; physics has given him radio and television, not to mention atomic energy; biology has provided him with antibiotics. The analogous transformation of mathematics is intrinsically harder for him to realize, although he has heard of giant computers and perhaps of the techniques of industrial quality control. There has been, perhaps, a failure of communication between the research mathematicians and the teachers, let alone laymen. But in any case, mathematics has changed. It is not what it used to be.

One of the most significant of these changes, and one of the truly remarkable achievements of recent mathematical research, has been the development of mathematical methods for dealing with phenomena in which chance plays a role. Previously, mathematical methods were applicable only to phenomena amenable to a deterministic description.

It is not surprising, therefore, that, in the second place, the applications of mathematics have changed. No longer is mathematics used only by physicists and engineers. The Social Science Research Council has a committee on the mathematical training of social scientists. Psychologists have published lists of mathematical problems found in psychological research literature. Sociologists call on mathematicians as consultants in sociological research. Economists utilize mathematical methods. A business executive who is not well trained in mathematics is likely soon to find it difficult if not impossible to make sound management decisions.

Moreover, industry is daily utilizing an application of mathematics in its systems of industrial quality control, a field now providing literally thousands of jobs. And, of course, the use of large calculating machines is literally creating many thousands of new positions requiring substantial mathematical training. An estimate by a responsible group is that each large calculating machine requires the serv-

ices of 10 such employees. There are expected to be 5,000 such machines in use in a decade; 2,000 are now on order.

Thus, when the Commission speaks of the "needs" of the second half of the twentieth century, it means the needs of mathematics, of physical science, of social science, of technology, of engineering, of business, of industry.

There remains an even deeper question, however. What touchstone is to be applied to mathematical subject matter to determine whether or not it should be included in a curriculum designed to meet twentieth century needs?

The Commission answers this question by pointing out that modern mathematics is much more than the mere addition of new subject matter to the store of mathematical knowledge. It embodies also a point of view. Indeed, the point of view is even more important in determining curricular content than is the new subject matter.

As Professor W. W. Sawyer has put it, the point of view of the older mathematics was to find a trick to solve a problem. Once found, the trick probably was of little or no use in solving any other problem; this required a search for a new trick. Mathematics was a collection of ingenious devices. How much of school mathematics is so taught still!

### *Insights instead of tricks*

However, the point of view of modern mathematics is to search for insights into the nature of a problem, for patterns of regularity that the mind can recognize, for unifying principles that will reveal the underlying pattern. Thus, a modern mathematician faced with a novel problem does not approach it by looking for an ingenious device; rather, he approaches his problem by examining its nature, asking what elements in it resemble problems he can solve, inquiring what there is about it that might make him think he ought to be able to solve it at all.

It is the view of the Commission that school mathematics should be judged by this criterion of modern mathematics—that while this subject matter of algebra, geometry, and trigonometry will certainly remain the core of the secondary school program, this ma-



terial should be reorganized so that it reflects the spirit and point of view of mathematics as insights into patterns rather than as a "bag of tricks."

One of the basic concepts of modern mathematics is that of "set." A mathematician means by a set exactly what you mean when you speak of a set of books, or a set of dishes, or a collection of stamps, or a set of weights, or the congregation of a church. Both you and the mathematician mean any collection of objects, such that one is able to tell of any object whether or not it belongs to the set.

Mathematicians talk mostly about sets of numbers, such as the set of all integers, or the set of all odd numbers, or the set of all perfect squares less than 100, or the set of all perfect squares less than 500 ending in 6 (it consists of 16, 196, 256), or the set of all even prime numbers (this consists only of 2); or sets of points, such as the set of all points on a certain line, or the set of all points inside a certain circle, or the set of points outside a triangle and inside its circumscribing circle.

Sometimes they introduce a joker, and talk, for instance, about the set of all perfect squares ending in 7, or the set of all points common to two circles that neither touch nor intersect. This "joker" set is called the empty set. There are no perfect squares ending in 7 and no points at all common to the two circles just described, so that the set containing these entities is empty. Another example would be the pages for French stamps in the album of a philatelist who collects only American issues; they also form an empty set.

In spite of the fact that this concept of set is so simple that children intuitively sense its meaning, and is so elemental that it is closely akin to the psychological phenomenon of recognition, it is capable of a significant mathematical development. More important for the school curriculum, it is a concept that is pervasive (in the sense that it is involved in all branches of school mathematics) and profound (in the sense that it hits close to the foundations of all these branches). Moreover, it is a unifying, clarifying, simplifying concept, as has been amply demonstrated by teachers who have based their instruction on this concept.

Approached from this point of view,

#### For additional information

Readers who wish to be put on the mailing list of the Commission on Mathematics to receive its current and future publications should direct their requests to the Commission on Mathematics, 425 West 117 Street, New York 27, N. Y.

algebra is no longer a disconnected mass of memorized tricks, but a study of mathematical structure; geometry no longer a body of theorems arranged in a precise order that can be memorized without understanding, but the study of properties of geometric configurations under specified conditions; trigonometry no longer a collection of formulas leading to lengthy computations by logarithms, but the study of important functions, useful both in advanced mathematics and in such practical problems as aerial navigation, as well as an invaluable element in the language of science.

It should be emphasized at this point that the Commission is not suggesting that high school mathematics begin with a formal, theoretical study of a new branch of mathematics, the theory of sets. On the contrary, it is urging only that the concepts and language of sets be introduced into secondary school teaching wherever and whenever the teacher feels that thereby he can simplify, clarify, and unify his instruction.

The Commission regards as one of the most important advantages of its approach to curricular revision the fact that it does not demand an "all or none" approach, that it does not propose closing the books on the old curriculum on a certain date and beginning a totally new program when the schools next open, but rather that teachers may introduce modifications as the way opens, and as their knowledge and experience permits them to do so.

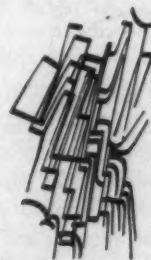
This attitude implies that an important element in the implementation of the Commission's recommendations is the training of teachers adequately prepared to teach the new program. The Commission has given serious

and sustained attention to this problem. It has prepared a statement on "The Education of Secondary School Mathematics Teachers," making suggestions for both in-service and pre-service training of mathematics teachers. This statement has been distributed widely and has been very favorably received.

The Commission also expects to publish a series of brief guides to help teachers over specific "rough spots" in planning for the new program, and has prepared for teachers a series of papers bearing such titles as, "Introduction to Algebra," "Concept of Sets," "A New Organization for Geometry," "The Nature of Reasoning in Mathematics," "A Deductive Sequence with Natural Numbers." These will be available to interested teachers some time during the present calendar year.

Moreover, several school systems or groups of nearby schools have organized study groups for their teachers, usually led by a professor from a nearby college or at least drawing upon such expert help in a consultative capacity. Incidentally, this is one of the most effective ways that College Board member colleges can promote and expedite the introduction of the new program, namely, by encouraging members of their mathematics staffs to serve as consultants or leaders of study groups composed of schoolteachers.

Perhaps the best way of gaining a picture of what the new curriculum



will be like is to compare it with the traditional program. It should be understood that there are many features of the new program that are quite flexible—indeed, this is deliberate—and that the organization set forth here has been adopted for clarity in exposition and not necessarily as the most desirable teaching order.

Traditionally, the ninth-grade course is elementary algebra. The Commission suggests little change in content

in this course; after all, it is in a sense the "bricks and mortar" out of which the further structure of mathematics is erected. The Commission does suggest a very different point of view, as has been pointed out above, and specifically recommends the inclusion of work on inequalities and the introduction of some deductive reasoning based on algebraic material. Neither of these items is now conventionally included.

Ordinarily the tenth-grade course is plane geometry. The Commission is recommending rather drastic changes in this course, so much so that it will no longer be appropriate to use the title, "plane geometry." The course will include the elements of plane and solid synthetic geometry and an introduction to analytic geometry. A major objective will be a formal treatment of deductive reasoning.

The question will immediately arise as to how all this work can be included in one year's time. The Commission has of course considered this possible objection. Its answer is in part that the use of analytic geometry in itself makes possible a tremendous saving in time. Again, once the idea of deductive reasoning and the nature of a



mathematical system have been made clear through a short chain of theorems, further elaboration of the sequence serves no useful purpose and can be omitted. Emphasis should be placed instead on original thinking and discovery; adequate clues to a proof should be accepted rather than insisting on a completely formal presentation of every newly introduced geometric fact. After all, no working mathematician ever presents or publishes a proof in the pattern of the elementary texts in plane and solid geometry.

The eleventh-year course is traditionally more algebra, sometimes with trigonometry included. The Commission believes that the essential parts of

so-called intermediate algebra and trigonometry can easily be covered in one year. In saying this, of course, it is assuming some modification of the traditional program, especially through omission of obsolete material and the introduction of a modern point of view in trigonometry.

#### *Seventeenth century survival*

Trigonometry is almost always taught as though the climax of the course were the solution of oblique triangles by logarithms. Not only is the solution of triangles no longer a major application of trigonometry, but logarithms are no longer a modern means of calculation. Perhaps more clearly here than in any other part of the high school program is the seventeenth-century orientation of the traditional content made manifest. Indeed, it is sad but true that the entire high school mathematics course ordinarily includes no mathematics more recent than the seventeenth century.

Present-day emphasis, both for the needs of theory and applications alike, should be on the analytic aspects of trigonometry, the properties of the functions, their relation to vectors. This approach is at once shorter, simpler, more useful, and more profound.

At this point a college preparatory student will have adequate preparation for a college course in calculus and related analytic geometry, and this, in the opinion of the Commission, is what freshman college mathematics should be.

The Commission is very definite and quite firm in stating that calculus should be regarded as a college course; it does not recommend a formal course in calculus for the ordinary high school student, even in the twelfth grade. It believes that when a standard course in calculus is taught in secondary school, this should be done as part of an advanced placement program with full recognition that the school is teaching a college course and should maintain college standards.

For the mathematics of the twelfth year—which will be elected ordinarily only by students planning scientific curricula in college, contemplating admission to engineering schools or institutes of technology, or having a liking for mathematics for its own sake

—the Commission recommends a new, one-semester course to be developed in part from traditional advanced or college algebra and to be called, "elementary analysis." This will consist of a study of the polynomial, logarithmic, exponential, and circular functions. An informal introduction to the concepts of calculus, limited to polynomials, will be included.

For the second semester, the Commission recommends another new course, "probability and statistical inference." In so doing it is giving recognition to the fact referred to above that this field represents one of the great advances of modern mathematics. It is recognizing, too, that in twentieth-century living statistical inference is at least as important as deductive reasoning, and affects all of us daily. If this statement seems extreme, consider public opinion polls, radio and television ratings, and aptitude or intelligence test scores, all of which affect in rather considerable measure what we may do with our lives, and all of which are statistical inferences from a sample.

#### *Revision in five years*

The revision of the secondary school mathematics program described here, while thoroughgoing, is not radical. Moreover, it is entirely practicable. There is no reason, provided that adequate funds are invested in in-service teacher training and pre-service curricula for mathematics teachers are appropriately modernized, why the new program should not have been effectively introduced for the great majority of college-bound high school students within five years. Such students will then be prepared for college work at truly a college level, which will make it possible to discontinue the high school courses now often taught to college freshmen.

More important, freshmen will have studied secondary school mathematics from the point of view of modern mathematics and will have taken courses oriented toward the needs of the present and the future. They will have gained a more adequate understanding of the true nature of the discipline that has been called both the queen and the handmaiden of the sciences. Nothing less seems adequate in this day and age.



## What must be done in science education

### Grave problems and possible solutions concerning an increasingly critical function of schools and colleges

Fifty years ago Henry Adams asserted that his education had not fitted him for the nineteenth century. How many of us could say the same? How many high school and college graduates this year could claim that their science education had fitted them for the mid-twentieth century?

The increasing difficulties in this area are partly the result of the growth of the subject. New developments in physics and chemistry, new concepts of the universe and of man, outstanding strides in aerodynamics, astrophysics, biochemistry, and radio astronomy make it imperative that more and more information be mastered by the student today than was the case 50 years ago.

Consider what it takes to be scientifically literate in 1957. The frontiers of scientific knowledge have been pushed so far in the last few decades that the formal courses in high school and college must cram much more into them now than ever before. With the number of discoveries increasing in geometric progression, with new elements being uncovered and produced, with new formulae, techniques, and experiments to be learned, the absolute essential minimum that must be taught in each of the sciences increases every year.

Future demands for scientifically trained persons also place great burdens on science education today. I am referring now not to the immediate, shifting demands which vary profession by profession and which are subject to oscillating business conditions, but to the long-term trends which indicate that with the continued development of our industrialized economy an increased percentage of the labor force will have to be in the category of pro-

fessional, technical, and kindred occupations. It seems evident that 25 years from now, and continuing through the year 2000, the United States will need over twice as many scientists and engineers as there will be available.<sup>1</sup>

To provide adequate instruction for these future members of our labor force will be a vaster challenge than science education has yet met. Courses must be reorganized, syllabi modified, textbooks modernized. The cultural lag in schools and colleges must be reduced. Work such as that which the Commission on Mathematics of the College Entrance Examination Board is doing to improve the teaching of that subject and revise the mathematics curriculum must be copied in other fields. Standards and requirements must be raised.

#### More science study helpful to all

Improved science education is necessary not only for those who will be future scientists, engineers, and technicians, but also for the majority of our school population so that they may be adequately prepared for the world in which they live and so that they may be free to choose the career for which their interests and aptitudes fit them. Increasing the amount of mathematics and science studies by all able students in school would be beneficial to them regardless of their eventual careers.

Courses in school or college, however, are only as good as those who teach them. Nathan Pusey recently observed that "classrooms in which there are teachers with no exceptional gifts

are places merely to keep young people, not to educate them. The absence of vitalizing personal qualities in the education process is more deeply and tragically injurious than a thoughtless adult world has yet been ready to recognize."<sup>2</sup> Science education's other problems are slight compared with those of finding and keeping an adequate supply of competent teachers.

The picture here is more dismal than many people realize. It has been estimated that over 100,000 high school students enrolled in mathematics and science classes in a recent year were taught by inadequately trained teachers. When a student is not well taught, what little interest he might have in the subject will soon be lost.

To mention the poor teaching that is sometimes found is not to minimize the great accomplishments of many good teachers, nor to overlook the important satisfactions in science teaching. There are today throughout the land many worthwhile courses in high schools and colleges fulfilling their objectives. There are many institutions placing a high value on intellectual accomplishment which are producing students well motivated for scientific and scholarly pursuits. There are many outstanding, stimulating, dedicated teachers who are providing excellent instruction in physics or chemistry or mathematics.

The intellectual rewards in teaching, the great joy in leading a group of able students toward new horizons, in opening doors of learning in biology or physics, far outweigh many of the dissatisfactions which science teaching may hold. Many teachers today, particularly when they are able through individualized programs, special en-

<sup>1</sup>H. Brown, J. Bonner, and J. Weir. *The Next Hundred Years* (New York: Viking Press, 1957), pages 119-120.

<sup>2</sup>N. Pusey, "The Exploding World of Education," *The Fabulous Future* (New York: E. P. Dutton & Co., 1956), page 70.



richment classes, and inspired use of laboratory resources to stimulate the talented students, can overcome some of the difficulties besetting science education.

But there are not enough of these teachers and therein lies one of the most serious problems facing science education today. There is currently a shortage of competent high school science teachers in the country. This shortage will become more acute and in the near future will spread to the college level and to other fields. One of the most serious threats to the educational well-being of the country is the shortage, almost the disappearance, of the competent, well-trained, stimulating high school science teacher. It is a breed that faces extinction.

#### 1956 teacher demand only half met

The following figures may help to give some idea of the seriousness of the situation. In 1956 over 8,000 new mathematics and science teachers were needed in the country. Sixty-eight hundred persons with qualifications to teach in these fields completed their training that year, but only 4,200 actually entered the teaching field that September. Only one-half of the demand that year was met.<sup>3</sup>

Since 1950 there has been a 50 per cent decrease in the number of college graduates prepared to teach mathematics, and almost a 60 per cent decrease in the number prepared to teach science. In 1955 there was one newly trained chemistry teacher for every 119 high schools in the United States, one new physics teacher for every 250 high schools.<sup>4</sup> In 1956 approximately 30 per cent of all graduates qualified to teach did not enter the teaching profession.<sup>5</sup>

A United States Office of Education study has revealed that one-half of those who entered the teaching profession last year expect to stop teaching within five years.<sup>6</sup> Industry under-

<sup>3</sup>National Education Association, "The Postwar Struggle to Provide Competent Teachers" *NEA Research Bulletin*, October 1957, pages 113-114.

<sup>4</sup>Harold C. Hand, "Black Horses Eat More Than White Horses," *Bulletin of the American Association of University Professors*, Summer 1957, page 276.

<sup>5</sup>National Education Association, *op. cit.*, page 114.

<sup>6</sup>*New York Times*, October 31, 1957.



standably attracts many capable teachers by offering higher salaries, better working conditions, more prestige. To make matters worse, some of the best high school teachers are drawn to college positions. According to a recent study almost 14 per cent of the new full-time college teachers entering the college teaching field during the last few years came directly from high school positions.<sup>7</sup>

It has been estimated that over the next 15 years more than three new teachers must be recruited for every two we have today, that during the next decade one-half of all college graduates would have to enter the teaching profession in order to fill our needs.<sup>8</sup> We face a revolution in the art of teaching.

The impending shortage of college teachers, particularly in mathematics and the physical sciences will be equally serious. For a nation of our size and development the small number of science doctorates currently produced may become a national tragedy. In 1956 there were only 470 Ph.D.'s in physics awarded in the United States (of which eight were awarded to women) and there were 986 Ph.D.'s in chemistry (of which 52 were given to women).<sup>9</sup>

Nor is education getting an ample share of the doctorates that are being produced. Almost three-quarters of the recipients of doctorates in chemistry in 1955 and 1956 took jobs outside education, according to a recent National Education Association survey. Sixty per cent of all Ph.D. recipients in physics took jobs in industry or government. The doctorate used to be a prerequisite for college teaching. During the past year, however, less than one-quarter of all new full-time college teachers held doctoral degrees.<sup>10</sup>

The growing shortage of teachers and expanding enrollments in schools and colleges pose an almost insuper-

<sup>7</sup>National Education Association, *Teacher Supply and Demand in Colleges and Universities* (1957), page 22.

<sup>8</sup>Fund for the Advancement of Education, *Teachers for Tomorrow* (1955), page 23.

<sup>9</sup>U. S. Department of Health, Education and Welfare, Office of Education, *Earned Degrees Conferred by Higher Educational Institutions, 1955-1956*, circular No. 499.

<sup>10</sup>National Education Association, *Teacher Supply and Demand in Colleges and Universities*, pages 17, 31.

able problem. As classes get larger it will become more and more difficult to provide high-quality science instruction to those who need it.

We can hardly expect capable young persons these days to consider a teaching career in the light of current teachers' salaries. If the talented person with a doctorate can secure a job with a beginning salary 25 to 50 per cent higher than a teaching position offers, should we be surprised that he feels no strong attraction toward teaching? If, after five years in an industrial position, he can make more than he will in half a lifetime of teaching, his affection for the academic profession must be strong indeed to keep him from taking a lucrative job in industry or government.

In 1956 the median salary paid to full professors in all institutions of higher learning was \$7,000; the median salary for associate professors was \$5,700; for assistant professors, \$4,900; and for instructors, \$4,000. Although some high schools have raised teachers' salaries considerably in the last few years, the picture here is also bleak. The median salary for teachers in public secondary schools in 1956 was \$4,350.<sup>11</sup> It is no wonder that teachers must take on additional jobs in order to make ends meet.

The shortage of teachers is partly the result of ridiculously low salaries in the academic profession. Another reason, however, why the nation has an inadequate supply of competent teachers is related to the public's attitude toward teachers and the teaching profession. Perhaps because of the general spirit of anti-intellectualism that seems to pervade our nation, the teacher is slighted, slurred, seriously deprecated by an unfortunately large number of persons.

What is the public image of the science teacher? The absent-minded professor, the ineffectual, eccentric egghead who must be teaching high school chemistry because he can't find another job—these are the stereotypes which thoughtless people perpetuate. What we are witnessing is a deprofessionalization of the teaching profes-

sion. An individual who would not think of questioning the word of his doctor or lawyer or plumber does not hesitate to question the views of his child's classroom teacher or to tell administrators how his school or his Alma Mater should be run. This is hardly the atmosphere conducive to recruiting talented persons to a teaching career. Recently the *New York Herald Tribune* declared in an editorial:

"Within the lifetime of many people now living, education was such an honored calling in this country that even a mere high school teacher was addressed as professor. Nowadays, if he is addressed at all, it is frequently with scorn. For present-day Americans measure things by price, and they know full well the price of a school-teacher. It is less than the price of a truck driver, or a fireman, or a barber; and it dishonors none of these worthy callings to say that such a state of affairs is a disgrace."<sup>12</sup>

The public attitude toward teachers is not unrelated to the public attitude toward scientists, science, and science education. A study of high school students' opinions by Hermann H. Remmers, director of the Division of Educational Reference of Purdue University, revealed that 25 per cent of them thought scientists were "odd" and 30 per cent believed it was impossible to raise a normal family and be a scientist.

Many persons appear to view science with a mixture of fear and adulation. It is dreaded for the destruction it is supposed to cause. At the same time it is spoken of in half reverent terms as the source of our prosperity, the reason for our technological superiority, the cure-all for all ills. A fuzzy aura of materialistic magic seems to be associated with the word in the minds of the public. Science is equated with magnetic refrigerator doors and swept-wing automobiles and hydrogen bombs. To many Americans, materialism is their sole motivation and scientific inquiry is something relegated to crackpots. It is not without accident that the United States was the first country to market a toy satellite.

Similarly, science courses are fre-

quently looked upon as designed merely for those preparing for a technical or scientific career. Students and their parents have vocationalized the life out of most of the curriculum and seem intent on vocationalizing the life out of science courses. Physics and chemistry are liberal arts, essential subjects for all reasonably able persons to study. Mathematics is an important language in our modern world, not a dull tool to be employed only by engineers and ballistics specialists.

### *Academic subjects neglected*

The secondary schools cannot completely be blamed for what the American people preferred them to become. When we undertook to provide all persons of high school age with a secondary school education, we forced schools to modify their curriculum. Therefore, many of them had to discard their traditional college preparatory role or at least relegate to a less important position the academic courses prerequisite to admission to college. Thus in their value systems students, and even educators, tended to put less emphasis on the traditional courses in physics, chemistry, and mathematics.

However, universal high school experience has been followed by an expansion of the expectation of a bachelor's degree, until now almost one-third of all high school graduates go to college. This is fine and any extension of the educational level of the population should be applauded. But it has meant that the colleges are now facing an influx of students with a different type of college preparation that has been described as "no longer dealing in depth" in the sciences and in mathematics.

Students come to college with poorly remembered formulae and with what has been called a "cookbook" attitude toward chemistry. They are unable to devise a strategy in handling difficult or abstruse material. They claim they have a "block" in trigonometry or "have taken" physics before and shy away from any course that has the slightest reputation for being intellectually demanding.

Moreover, vocationalism has swept like a wave over our adolescent population. As Richard Hofstadter has put

<sup>11</sup>National Education Association Research Division, "Salaries Paid and Salary Practices in Universities, Colleges, and Junior Colleges," *NEA Research Bulletin*, October, 1956, page 118.

<sup>12</sup>*New York Herald Tribune*, October 9, 1957.



it, "a large part of American education has long since been given over to vocationalism and to triviality."<sup>13</sup> Preparation for earning a living is considered more important than preparation for life. Training rather than learning is the desideratum. Every course is viewed for its practical value, its cash nexus.

What has the popularization of the "practical" curriculum meant? In the words of William Whyte, "by default the anti-intellectual sector of education has been allowed to usurp the word 'democratic' to justify the denaturing of the curriculum."<sup>14</sup> Democratization of the curriculum has meant that science courses compete with a wide variety of peripheral subjects whose practical appeal frequently outweighs their intellectual intensity. Schools and colleges are becoming more like supermarkets where packaging pays and where the majority or common denominator determines the shape of the curriculum.

Here is an illustration of what I have in mind. In its recent book on *Womanpower*, the National Manpower Council reported: "The preference among high school girls for courses of study which promise to equip them for jobs immediately after graduation is indicated by the fact that relatively few of them enroll in an academic curriculum. However, some educators report that a number of girls decide against a college preparatory program simply because the subject matter of many courses in other curricula is easier to master, and not because of occupational considerations."<sup>15</sup>

What is the result? In 1954, according to an Office of Education study, boys and girls enrolled in elementary mathematics courses in high schools in equal numbers. However, 60 per cent of all enrollments in plane geometry and intermediate algebra were boys, and 80 per cent of those in trigonometry and solid geometry courses were boys. Sixty per cent of those taking high school chemistry were boys, while 80 per cent of all physics enroll-

ments were boys.<sup>16</sup> Apparently not many girls realize that our society can no longer afford to have science be only a masculine enterprise.

Science education not only encounters difficulties as a result of low teaching salaries, working conditions that could be improved, competition with peripheral subjects, and lack of status or prestige for the academic profession. It also faces problems as a result of the American public's attitude toward intellectual giftedness. Much of our tradition seems to be based on a denial of the fact of inherent differences in ability. The American people have taken equality of rights, privileges, and opportunities to mean equality of endowments and have shaped their educational thinking accordingly.

Special programs for the gifted have been branded as undemocratic. Adjustment has been given a higher premium than achievement. Some people are even suspicious of marked scientific ability in a young child and find something sinister in the full development of his intellectual capacities. The roots of Jacksonian democracy go deep. Devote any special attention to the talented, it is thought, and you are likely to develop an elite. And so in defense against giftedness there has emerged in America a cult of mediocrity.

#### *Anti-intellectual patterns*

The students themselves learn quickly what is valued most in their society. The "take-it-easy," materialistic, pleasure-loving attitude of our age is hardly conducive to the sort of intellectual endeavor necessary for adequate performance in science courses. The love of entertainment and the avoidance of hard work will probably always be characteristic of school populations. But our popular culture reinforces this attitude in an adolescent and when there is little encouragement from the home or elsewhere to emphasize the value of academic subjects, it is understandable why the student tends to avoid them.

The love of learning on which our



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arts and letters rest, on which our science thrives, is a love that few adolescents succumb to. But if the talents of Elvis Presley and Marilyn Monroe attract their adulation and if the mathematics teacher, the bookish introvert, and the eccentric egghead draw their scorn, today's adolescents are only conforming to the value patterns of their elders.

Science education is likely to become a casualty of this "degradation of the democratic dogma." Norbert Wiener has declared, "one of the rare and incalculable benefits for which we must provide if the race is going to survive is the sudden emergence on the scene of great and original intellects."<sup>17</sup> However, in most of our educational systems today the original intellect is stifled, and quality is second to quantity. Unfortunately, as Dean John R. Dunning of the Columbia University School of Engineering recently remarked, the rest of the world, if not America, "is aware that the future belongs to the nation with the best technical brains."<sup>18</sup>

There is a further difficulty I would like to mention, a difficulty that was intensified the day the first Sputnik began tracing its awesome orbit across the sky. Science education today faces the danger of hysterical over-emphasis on the weapons aspect of science. To be scientifically superior to the Soviet Union is a commendable objective, but the reasons for strengthening science education transcend the demands of the cold war. The time has come to assert the educational values of studying the atom, photosynthesis,

<sup>13</sup> "American Higher Education," *College Admissions 3* (New York: College Entrance Examination Board, 1956), page 23.

<sup>14</sup> *The Organization Man* (New York: Simon and Schuster, 1956), page 100.

<sup>15</sup> (New York: Columbia University Press: 1957), page 177.

<sup>16</sup> U. S. Department of Health, Education, and Welfare, Office of Education, *Offerings and Enrollments in Science and Mathematics in Public High Schools*, pamphlet 118, 1956.

<sup>17</sup> *I Am a Mathematician* (New York: Doubleday, 1956), page 363.

<sup>18</sup> "If We Are to Catch Up in Science," *The New York Times Magazine*, November 10, 1957, page 19.



the solar system, or the nerve system of a frog.

Literacy today means more than knowing how to read and write. It also means some familiarity with the ways of the molecule and the meteorite, some knowledge of electromagnetism, some awareness of what radiation is. Scientific literacy is essential for the future businessman, the future lawyer, the future politician, the future housewife and mother. The teaching of science is a cultural activity and there is need for extension of the basic function of science education just as there is need for continued support of basic scientific research. Science education needs to be supported not simply so we can rival the Russians but as a good in itself.

In viewing the current problems of science education, there are those who would single out our teacher-training programs as major contributors to the difficulties. It may well be that a certain overemphasis on methods courses at the expense of content courses has hurt the preparation of science teachers over the years. It has been asserted that in many states the requirements for teacher certification tend to emphasize straight education courses at the expense of subject matter.

But it must be borne in mind that many persons who are currently teaching physics and chemistry in our schools lack adequate preparation and interest simply because they were trained primarily for another subject area. Furthermore, I think that attacks against teachers colleges and departments of education by those of us working in liberal arts colleges serve only to create a smokescreen obscuring the more fundamental difficulties which exist. The great issue today in schools and colleges should not be between the traditionalists and the educationalists but rather between those who subscribe to the intellectual qualities and those who do not. Anti-intellectualism is the curse of our materialistic age. The cultural problem is pervasive.

Now what is to be done? Let me suggest a number of remedies.

First, teacher salaries at all educational levels must be raised, not 10 per cent here, 10 per cent there, but raised drastically. Unless there is a doubling of teacher salaries at all educational

## Westward, ho!

BY HOWELL F. NOMER, Assistant to the Principal,  
Fieldston School, New York, New York

This past May, denial of admission to an "eastern" college meant a great many things to a great many people. To the student himself it undoubtedly meant heartache and a more than slight feeling of inferiority. To his parents, in too many cases, it came as a shock. To the school head it meant at least some discomfiture and, at most, a good deal of long-distance telephoning, telegraphing, and letter-writing to a substitute institution, probably one rather hastily selected. Even to those who were admitted, the letter of acceptance climaxed a senior year of very tense nervous anticipation.

To the director of admissions at a small, uncrowded, coeducational midwestern college of reasonably good academic repute, this denial meant help in bringing enrollment closer to capacity. During May and early June, my office was the target of many long-distance phone calls, telegrams, special delivery letters, and personal visits from disappointed students who had not "made" the eastern institution of their first, second, or even third choice. I am sure that our case was typical of many midwestern and western colleges which opened last September *still not filled to capacity*.

Unbelievable, isn't it? Especially unbelievable after the pages and pages of newsprint and magazine stories which have been devoted to describing the tense competition for college entrance.

Having since become a secondary school administrator, I can now put in an earnest plea to high school students and their parents who are about to start across the college application tightrope without being accused of slipping in a quick commercial. My advice: Think carefully before setting your heart on a "name" college; it's the education itself that really matters. Start in early to explore possibilities at other institutions, less known but equally excellent, in the Midwest and West.

To myself, brought up in the "eastern prep school" tradition and graduated from one of the nine "colonial" colleges, it was an eye-opening experience to learn that there are indeed many excellent institutions of higher learning west of the Allegheny Mountains. This is a confession of past ignorance, but my former naïveté is shared by too many Easterners who should know better. In my five years as a college admissions director, I traveled over much of the Midwest and West to visit high schools. Whenever I chanced to be near a college or university and had time to spare, I would try to visit the campus.

Thus I feel I can speak with more than a little authority about the vast resources and educational opportunities available at some of the larger state universities, such as Illinois, Wisconsin, or Iowa. Or for those inclined toward a smaller institution, I can testify to the sun-drenched beauty of the University of Redlands campus in late March; to the breath-taking grandeur of the high mountains visible from Colorado College; and to the friendly spirit evident on the campuses of Lawrence, Wabash, Knox, or Reed.

But mere physical beauty or friendly spirit will not by itself guarantee a good education. It is from leading educators, especially those at the well-known eastern colleges, that real assurance will come to the doubting high school senior or his parents that stone for stone, endowment dollar for endowment dollar, Ph.D. for Ph.D., those colleges in the further reaches of our country are every bit as good as their eastern brother and sister institutions.

levels we cannot restore the academic profession to the competitive position it must have if an adequate number of talented persons are to be attracted to it.

Second, greater efforts must be made to attract capable persons, particularly persons with scientific ability, to the teaching profession and to retain them once they have begun teaching. Some recruitment programs are already underway. But most of them are hit-and-miss efforts by individual institutions. More institutional cooperation is needed here. This year the Association for Higher Education established a National Committee for the Recruitment of College Teachers which hopes to conduct studies and stimulate programs of action in this area. But efforts to recruit high school and college science teachers will be of no avail if salaries are not raised and the public attitude toward the teaching profession is not changed.

Third, there must be more extensive efforts to provide science teachers with the continued training they need to keep up to date in their field or to assist those who find themselves teaching science material for which they are not prepared. Here again, notable efforts have recently been made. During the summer of 1957 the National Science Foundation sponsored almost 100 summer institutes attended by over 4,500 high school and college teachers of science and mathematics interested in improving their knowledge and teaching capabilities.

#### *Public support necessary*

Fourth, there must be wider financial and public support of elementary, secondary, and higher education, particularly science education. A larger proportion of the tax dollar must be devoted to improving facilities in public schools, to providing more adequate laboratories, to expanding and improving college and vocational counseling, and to supplying more instructional materials. There must be increased financial support for colleges. Per capita expenditures for higher education now equal \$18.50. Per capita expenditures for tobacco and alcoholic beverages currently are \$85, while Americans spend \$79 on recreation for every man, woman, and

child. We have the financial resources in this country to support a higher quality of education than we are now doing.

Fifth, greater efforts must be made to salvage to higher education and professional fields those high school graduates who have the ability to go to college, yet who lack the financial means or the interest to go. The loss of talented students from high school to college is a waste we can ill afford to ignore. As I have previously observed, each year between 60,000 and 100,000 high school graduates with high ability do not go on to college for financial reasons.<sup>10</sup> Of this number, it is probable that each year between 8,000 and 15,000 male high school graduates with marked scientific talent and interest could be retrieved if they could be found and provided with sufficient financial aid to enable them to go to college. The loss to science and engineering of able young women is probably twice as great.

More scholarship aid is urgently needed. It is a sad commentary on America's failure to conserve intellectual resources that three out of every 10 individuals with the intellectual capacities to rival our most brilliant professors and our most productive inventors fail to attend college.

Sixth, there must be greater flexibility in our educational system. We must be more imaginative in our use of acceleration and enrichment programs. We must emancipate ourselves from the old lock-step year-by-year progression from kindergarten to the Ph.D. that requires everyone to move at the same speed. We must cut the cloth to fit the man. In order to secure the fullest realization of our intellectual potential, to make our science education more effective, we must stimulate the boy or girl with scientific talent to move ahead as far and as fast as he is able to go. To force the gifted youth into the same educational mold as the mediocre pupil is to permit intellectual featherbedding.

Significant strides have recently been taken to introduce more flexibility into the curriculum. Results of the

Early Admission Program of the 1950's indicated that intellectually able 16 and 17-year-olds could skip the senior year in high school and do better academic work in college than their older classmates of comparable ability without significant social maladjustment. The Early Admission Program was particularly successful in moving students with science interests and talents along at a more rapid than normal pace. Another program that holds great promise for science education is the Advanced Placement Program sponsored by the College Entrance Examination Board.

#### *Ph.D. six years after high school*

Let me mention a third example of the type of flexibility which is needed. Columbia College is planning to institute on an experimental basis a new chemistry major for scientifically oriented able students which will give them a course in organic chemistry in their freshman year and which will result in their having met the requirements for a master's degree in chemistry at the end of their senior year without sacrificing any of their important liberal arts education. Such a plan will enable talented persons to acquire a Ph.D. degree six years after graduation from high school.

Seventh, and finally, if science education is to prosper, the suspicious and antagonistic attitude toward genius must somehow be abated. The American people must give to the intellect, to the inquiring mind, to the disinterested pursuit of truth, to the scientific spirit their true value or else sink in a miasma of mediocrity. Our love of leisure must not eclipse our love of learning. America must awaken to the short-sightedness of her anti-intellectual leanings.

Every generation in human history has had its own crises; every generation has also had its own opportunities. At this particular moment in our history we stand on the threshold of great developments. We are witnessing the birth of a wonderful new age. But if we are to enter that new age and to play the part it will demand of us, then our science education for all persons must be strengthened so that the youth of our country may meet the challenges that lie ahead.

<sup>10</sup> "Who's going to college?" *College Board Review*, No. 27, page 13; *Encouraging Scientific Talent* (New York: College Entrance Examination Board, 1956), page 77.

## How colleges should pick their students

A critique based on analyses of admissions decisions and of a 330-college survey of admissions practices

One of the most important problems each college has revolves about the question, "Who shall be admitted?" In most institutions an admissions officer and his assistants decide whether or not each applicant is qualified for admission. The role of the admissions officer is obviously a crucial one. He, more than anyone else, determines what use is made of tests in the college admissions process. It is for this reason that in the summer of 1957 I conducted a questionnaire survey of 330 college admissions officers.

But before I give some specific results from the survey, an interpretation of them, and some suggestions for the future, I would like to discuss six items of background information.

First, research over a period of many years has shown that colleges in this country differ markedly with respect to the quality or ability level of freshmen they enroll. A fairly old and too often forgotten study by Arthur E. Traxler<sup>1</sup> pointed out that in 1937 the range in average IQ in the 323 colleges in the norm group for the American Council on Education Psychological Examination was from an IQ of 94 to an IQ of 123. Certainly it seems reasonable to expect that if the average IQ for each of the 1,800 colleges in the country were computed there would be many institutions with averages below 94 and above 123.

The ability of freshmen who entered 41 colleges in 1946 was described by Dael Wolfe in his informative book, *America's Resources of Specialized Talent*.<sup>2</sup> In commenting upon the variability among the colleges in Army Gen-

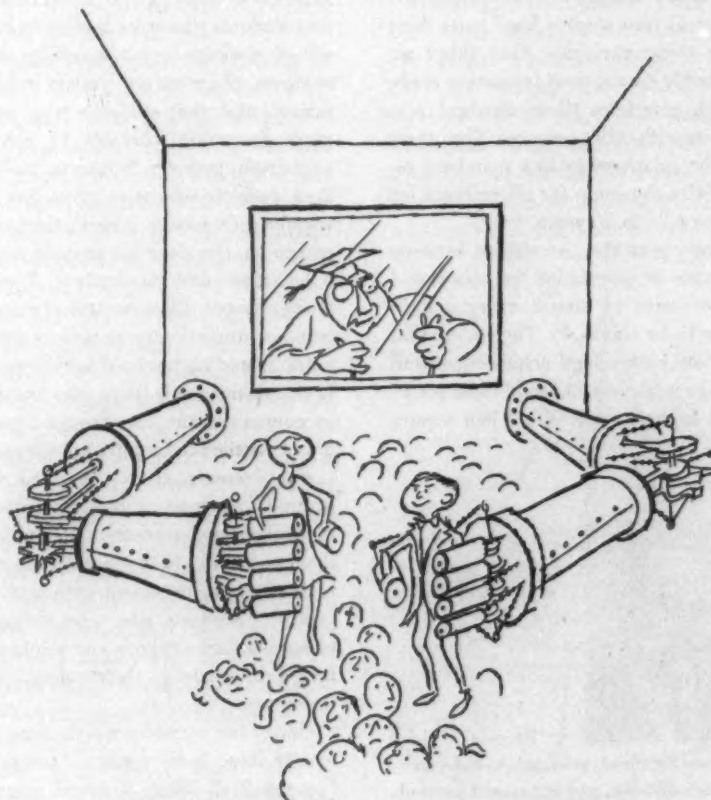
eral Classification Test scores, he noted that the median AGCT score of freshmen at the lowest ranking college was 108; the median at the highest ranking college was 131. Dr. Wolfe indicated that the extreme colleges were private, nonsectarian, and accredited.

The data I have collected from admissions officers and from other sources strongly supports the view that colleges, both public and independent, differ considerably in the quality of freshmen they admit. While this variability between institutions may disturb some it rather pleases me to think

that there is a college with an appropriate ability level for almost every high school graduate.

I said almost because we do not, as far as I know, have a college with an average ability level high enough so that the top 3 per cent of the nation's high school graduates would be about average and challenged at their level. And it may be true that we do not now have a formal college program appropriate for the bottom 3 per cent.

Second, students enrolled in any one college do not have the same ability; the differences among students are tremendous. For example, the freshmen enrolled in the college having the lowest average score in Dr. Wolfe's sample were not uniformly weak. Half the



The role of the admissions officer is obviously crucial

<sup>1</sup> "What Is a Satisfactory IQ for Admission to College?", *School and Society*, No. 51, pages 462-464.

<sup>2</sup> (New York: Harper & Brothers, 1954).



freshmen made scores between 99 and 117. The bottom quarter were below 99 and the top quarter above 117. Similarly, all freshmen in Dr. Wolfe's top-ranking college were not uniformly strong. One-quarter of them had scores below 126 and one-quarter had scores above 137. This great heterogeneity in ability probably means that if each student is to do satisfactory work in his institution, most of the bottom quarter will have to work much harder than the average student and most of the top quarter need not exert themselves in order to perform satisfactorily.

### One-half don't graduate

Third, a large number of freshmen who enter college with the intention of graduating do not graduate. For the entire nation, the percentage of freshmen who graduate is usually placed somewhere around 50. This high attrition rate represents a great loss in human resources.

Fourth, academic aptitude test scores and other intellectual or achievement variables, such as average high school grade or high school percentile rank, correlate substantially with academic success in college. Literally thousands of prediction studies have been done with these variables. One thing we probably do not need is another study which correlates these standard predictors with college success. The extent of the relationship has remained essentially the same for all colleges for the past 35 to 50 years.

Each year the correlation between entrance or orientation test scores and achievement in almost every college tends to be about .45. The correlation between high school achievement and college achievement tends to be somewhat higher, about .55. When a com-

bination of test scores and high school achievement is correlated with college achievement the correlation tends to be about .64.

The relationships which have been established permit us to indicate that those with low scores are likely to do unsatisfactory work and those with high scores are likely to do satisfactory work or better. A concrete way of seeing the significance of the relationship is to examine the college grades of those who are at the extremes in ability. In general those who rank in the bottom 5 per cent of their freshman class have about one chance in 11 of doing as well as or better than the average student. Those who rank in the top 5 per cent of their class in ability have about 10 chances in 11 of doing as well as or better than the average student.

Fifth, many variables and factors other than tested aptitude and high school performance have been investigated as possible predictors of college success but nothing of much practical importance has been uncovered.

While it is true that studies usually find that the children of professional workers perform better in college than children of semi-skilled workers, and that students who were leaders in high school perform better in college than students who were not leaders in high school, and that students who were given favorable forecasts by school principals perform better in college than students who were given less favorable forecasts by school principals, and so on, this does not provide much if any new valid information. Almost always the two different student groups being compared vary as well in tested aptitude and high school achievement. If this difference is taken into account or controlled, the two groups almost never perform differently in college.

For example, if you selected one group of students who were children of professional workers and matched them according to tested aptitude and high school achievement with another group of students who were children of semi-skilled workers, you would not find a difference in their college performance.

One of the variables which many attempts have been made to assess is "personality." While it seems reasonable to believe that many students fail

or succeed in college largely because of their personality, the important point is that at the present time we cannot identify potential failures by assessment techniques currently available—and this definitely includes the interview.

My sixth and final point is that research in a variety of areas shows that in general more accurate assessments and predictions are made by a formula or actuarial table than by an expert in human behavior. Paul E. Meehl, in a book titled *Clinical Versus Statistical Prediction: A Theoretical Analysis and a Review of the Evidence*,<sup>3</sup> shows that the human judge or clinician is not very reliable and that he tends to overvalue information with little or no validity with the net result of relatively inaccurate assessments.

Studies by E. Lowell Kelly and Donald W. Fiske,<sup>4</sup> Richard S. Melton,<sup>5</sup> Theodore R. Sarbin,<sup>6</sup> and others disclose that more accurate academic predictions can be made by a mechanical combination of test scores and previous academic record than by assessment psychologists who are trained in evaluating people.

### Human vs. mechanical predictions

It is possible though it is improbable that admissions officers are atypical with respect to their predictive ability. Perhaps they can integrate all the information that they collect and make surprisingly accurate assessments. In an article published a little more than a year ago, I suggested that each admissions officer test himself and see if his appraisal of an applicant's academic promise was superior to that revealed by a mechanical combination of an aptitude test and high school achievement.<sup>7</sup> As far as I know no col-



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<sup>3</sup> (Minneapolis: University of Minnesota Press, 1954.)

<sup>4</sup> *The Prediction of Performance in Clinical Psychology* (Ann Arbor: University of Michigan Press, 1951).

<sup>5</sup> "A Comparison of Clinical and Actuarial Methods of Prediction with an Assessment of the Relative Accuracy of Different Clinicians," (Ph.D. thesis, University of Minnesota, 1952).

<sup>6</sup> "A Contribution to the Study of Actuarial and Individual Methods of Prediction," *American Journal of Sociology*, No. 48, 1942, pages 593-602.

<sup>7</sup> "Prediction, Selection, Mortality, and Quality Control," *College and University* No. 32, pages 34-52.

Table 1. Predictions by 80 admissions officers and by one test score for 12 college applicants

Student case number	Number of admissions officers' predictions in each category			Student's actual college performance	Officers' prediction <sup>4</sup>	Officers' errors <sup>5</sup>	SAT-V score	College average SAT-V score	SAT-V prediction <sup>6</sup>	SAT-V prediction error <sup>7</sup>
	AA <sup>1</sup>	A <sup>2</sup>	BA <sup>3</sup>							
1	0	13	67	A (2)	BA (3)	1	494	575	-81 (A:2)	0
2	3	37	40	AA (1)	BA (3)	2	347	500	-153 (BA:3)	2
3	0	8	72	AA (1)	BA (3)	2	420	600	-180 (BA:3)	2
4	9	49	22	A (2)	A (2)	0	419	580	-161 (BA:3)	1
5	39	31	4	BA (3)	AA (1)	2	678	525	+153 (AA:1)	2
6	9	65	6	A (2)	A (2)	0	563	580	-17 (A:2)	0
7	67	12	1	AA (1)	AA (1)	0	525	475	+50 (A:2)	1
8	43	32	5	BA (3)	AA (1)	2	705	600	+105 (AA:1)	2
9	17	51	12	BA (3)	AA (2)	1	513	560	-47 (A:2)	1
10	43	37	0	BA (3)	AA (1)	2	582	580	+2 (A:2)	1
11	0	11	69	A (2)	BA (3)	1	486	550	-64 (A:2)	0
12	80	0	0	AA (1)	AA (1)	0	743	620	+123 (AA:1)	0
Total	310	346	298			13				-12

<sup>1</sup> Above average college performance by the student; numbered as category 1.

<sup>2</sup> Average college performance by the student; numbered as category 2.

<sup>3</sup> Below average college performance by the student; numbered as category 3. The "inferior" and "flunk-out" prediction categories of the original Colloquium experiment have been combined to give this single category.

<sup>4</sup> Category chosen by most admissions officers.

<sup>5</sup> Number of categories by which category of student's actual performance differs from category chosen by most admissions officers.

<sup>6</sup> "Average" performance is predicted if the student's SAT-V score falls within 100 points of the college's SAT-V average, "above average" if it falls more than 100 points above and "below average" if it falls more than 100 points below.

<sup>7</sup> Number of categories by which category of student's actual performance differs from category predicted by SAT-V.

lege admissions officer has done this.

While I therefore do not know how accurately any individual admissions officer can predict student performance, I do have two sets of data concerned with the predictive ability of a substantial group of college admissions officers. One would suppose that, in general, an appraisal by two judges is more reliable and valid than an appraisal by one, and an appraisal by three is better than an appraisal by two, and so on.

The first set of data was collected by Henry S. Dyer.<sup>8</sup> Eighty of the nation's leading admissions officers who met at the first College Board Colloquium on College Admissions in October 1953 were asked to give their individual evaluations of 12 college applicants' case histories in the form of a prediction of performance in college for each. Dr. Dyer indicated that all the available file data on these 12 actual admissions cases were presented. Forecasts were to be given in one of four categories: above average, average, inferior, and flunk-out.

The accompanying Table 1 summarizes the 80 admissions officers' predic-

tions, the students' actual performance in college, and my own analysis of the cases. In the table, I have combined the "inferior" and "flunk-out" categories of prediction into the single "below average" category.

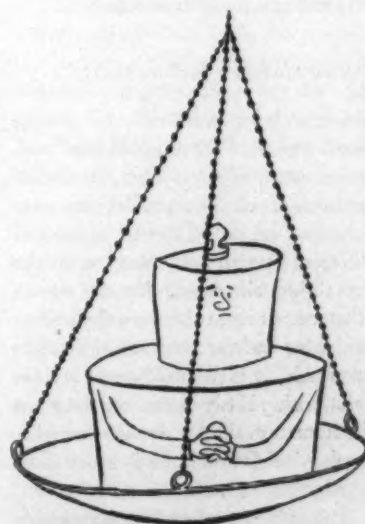
Shown in the first few columns of Table 1 are the predictions of the admissions officers and the actual performance of the students. At least two things merit comment. First, and perhaps most important, the admissions officers do not agree with each other. The implications of this are overwhelming. It suggests that an institution practicing "selective admissions" may enroll one group of students from a specific set of applicants if it has Mr. X as its admissions officer but may enroll a different group of students from the same set of applicants if it happens to have Mr. Y. as its admissions officer. It is possible, though unlikely, that the students selected by Messrs. X and Y would be equal in quality. The individual admissions officer's personality, needs, values, biases, and so on undoubtedly determine, consciously or unconsciously, the applicants who he thinks will succeed or are qualified for admission.

The second thing which deserves comment is the inaccuracy of the admissions officers' predictions. Only 13

of the 80 officers correctly predicted Case 1's performance. Only a small minority of all predictions were right. Thank goodness for case 12!

However, it is improbable that the admissions officers would have done so poorly on a random sample of, say, 100 cases. Although Dr. Dyer did not say how the 12 cases were selected, on the basis of this and other evidence, it can be said that the applicants were, as a group, rather unpredictable.

From Table 1 it may be seen that



Mechanical methods more accurate

<sup>8</sup> "The evaluation of case histories," *College Admissions I* (New York: College Entrance Examination Board, 1954), pages 109-121.

Table 2. Predictions by 10 "admissions committees" and by test scores plus high school class rank for 10 men applicants

Student's fictitious name	Committees' rank <sup>1</sup>	Student's actual col- lege rank <sup>2</sup>	Errors by committees <sup>3</sup>	SAT-V plus SAT-M scores	SAT score rank	HSPR <sup>4</sup>	Rank by HSPR	SAT rank plus HSPR rank	Rank by SAT plus HSPR	Errors by SAT plus HSPR <sup>5</sup>
Gap	1	1	0	1506	1	98	1.5	2.5	1	0
Fan	2	2	0	1158	5	98	1.5	6.5	2	0
Diz	3	5	2	1128	6	93	4	10	4.5	0.5
Art	4	10	6	1381	2	80	7	9	3	7
Bat	5	9	4	1296	3	51	10	13	8	1
Haw	6	8	2	1255	4	89	6	10	4.5	3.5
Elk	7	3	4	1024	7	90	5	12	6.5	3.5
Ian	8	4	4	910	9	97	3	12	6.5	2.5
Cot	9.5	6	3.5	978	8	77	8	16	9	3
Jet	9.5	7	2.5	642	10	54	9	19	10	3
Total			28.0							24.0

<sup>1</sup> Obtained, essentially, by adding the number of committees "admitting" each student in the Colloquium experiment.

<sup>2</sup> In college graduating class.

<sup>3</sup> Number of places by which committee rank differs from actual rank.

<sup>4</sup> High school graduating class rank expressed in percentiles.

<sup>5</sup> Number of places by which "rank by SAT plus HSPR" differs from actual rank.

the admissions officers' predictions resulted in a total of 13 "errors" and the Scholastic Aptitude Test-Verbal score (SAT-V) predictions resulted in 12. This difference of one error is not statistically significant, but it is interesting to note that predictions made by 80 experienced admissions officers are not superior to those made mechanically by one test score. The admissions officers used this test score, as well as a great deal of additional information, in coming to their decisions, but the net effect was not more accurate predictions. (The actuarial predictions, it should be emphasized, can be made by a clerk just as a clerk determines whether a senior has met all graduation requirements.)

#### Personal choice follows SAT-V

On examining the "officers' prediction" and the "SAT-V prediction" columns, one will see a high correlation between them. The predictions were identical for six of the 12 cases, and different by only one category for the remaining six cases. Almost always when comparisons between the human evaluator and the mechanical formula are made, it is found there is a close relationship between the two; but when the human evaluator departs from the mechanical formula, he is more often wrong than right.

The only other data I have been able to find which I could use to compare

the predictive ability of admissions officers with that of a formula was reported in *College Admissions* 4.<sup>9</sup> In this evaluation experiment, 10 mock "admissions committees," each composed of seven college admissions officers and three secondary school representatives, were formed among the participants at the fourth College Board Colloquium on College Admissions held in October 1956. Without going into the details of this "exercise in assessment," the object was to "admit" three of 10 men applicants to one hypothetical college and seven of the same 10 to another hypothetical college, and to do the same for 10 women applicants. As in the previous experiment, all available admissions data on the students, drawn from actual college files, was given to the committees, while the students' actual college performance was kept secret.

Table 2 shows how the 10 men applicants actually fared in college as compared to how they were "ranked" by the "admissions committees" and compared also to their ranking by a mechanical combination of SAT scores and high school class rank expressed in percentiles.

As may be noted from the table, committee "errors" totaled 28 and mechanical formula errors, 24. Simi-

lar analysis of the material on the 10 women applicants produced 29 committee errors as against 28 for the mechanical formula. Since the results of these analyses are consistent with those of the experiments involving the 80 admissions officers, no further comment is necessary.

#### 330 admissions officers surveyed

Let me now turn to some of the results from my questionnaire survey of the college admissions officers. About 94 per cent of the 330 admissions officers answered the questions upon which the following material is based. According to the admissions officers, one-third of the institutions now use for admissions purposes ability test scores for practically all (90 per cent or more) of their freshman applicants. Over four-fifths of the private institutions use tests in evaluating applicants but only one-quarter of the major state-supported institutions use them.

Only about one-third of the institutions who do not now use tests think it is likely that in about five years they will request applicants to present ability test scores; almost half of the admissions officers said they did not know whether their institutions would require ability test scores for admission, and the remainder, almost one-fifth, said their institutions would not be using tests for admission. Practically every institution which does not re-

<sup>9</sup> "An exercise in assessment," *College Admissions* 4 (New York: College Entrance Examination Board, 1957), pages 90-108.



quire an ability test for admission administers one to new freshmen during an orientation period or shortly after they are enrolled.

When the admissions officers were asked, "Approximately what relationship (correlation coefficient) is usually found at your institution between tested ability and freshman grade-point average?" over one-half of them did not know. The average correlation coefficient reported was about .50. It was surprising to see that the coefficients reported by the admissions officers of the Ivy League colleges and the Big Seven women's colleges were essentially the same as those reported by the junior colleges.

While about nine-tenths of the admissions officers said their institution had information on the tested ability and high school performance of enrolled students, less than half of them said they knew the approximate mean and standard deviation of the scores of their freshmen.

About half of the admissions officers said they and their institutions would be willing to release information on the quality of their freshmen to other admissions officers throughout the country. Only about one-tenth of the admissions officers who had the information said they would not release it.

In response to my query: "If a freshman applicant were to ask you for the

mean ability test score and high school percentile rank (or average high school grade) of freshmen enrolled at your institution, and you had the information, would you give it to him?" about one-third of the officers answered "yes," one-quarter answered "no," one-third answered "don't know," and the remainder, less than one-tenth, did not answer the question.

Only about one-fifth of the institutions now supply freshman applicants information on the tested ability and/or high school performance of enrolled freshmen.

Although some admissions officers could not believe I was serious, I asked them: "In general do you think it would be wise for institutions to discourage or refuse freshman applicants whose tested ability and past performance is considerably *above* that of the average freshman in the institution?" A little less than one-tenth answered "yes," about four-fifths answered "no," and one-seventh indicated they were "undecided."

When asked, "Have you ever discouraged or refused admission to an applicant because his tested ability and/or past performance was too much higher than the average freshman in your institution?" only about 3 per cent said "yes."

Percentages ranged from 0 to 50 in answer to the question, "Approximate-

ly what percentage of the freshmen who are accepted for admission by your institution do you personally feel are *not sufficiently qualified* to do satisfactory college work?" However, the average was about 6 per cent.

A little more than half the admissions officers said they would refuse admission or would be likely to refuse admission to applicants who fell below a certain level on an aptitude test in high school percentile rank, or on a combination of both. A little less than half of the officers said they would not.

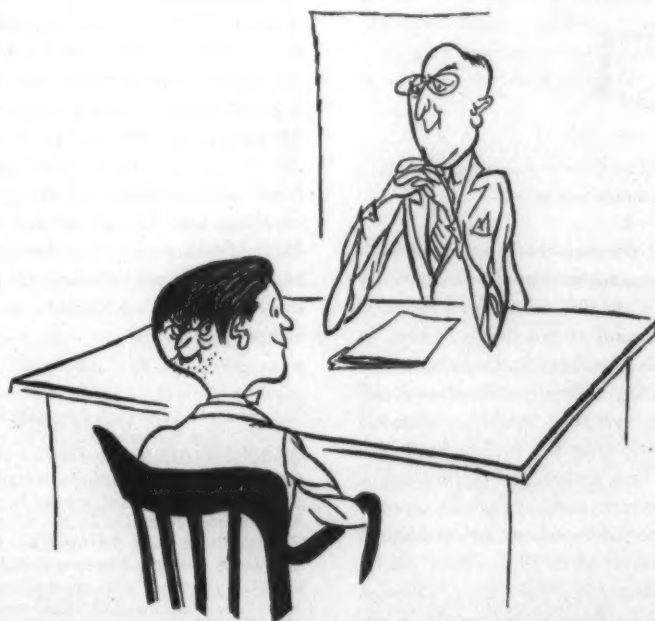
Space does not permit the inclusion of the many interesting comments made by the admissions officers on their questionnaires and in their letters. But here are a few which reflect rather typical problems or points of view. The admissions officer of a junior college, in explaining why he had indicated that from 6 to 10 per cent of his admitted students were insufficiently qualified to do satisfactory college work, said: "As a public junior college we are obliged to admit any student making application. A number of them are inadequately trained or do not have the mental capacity to do college work."

The admissions officer of one of the major institutes of technology indicated he felt that none of his admitted students were insufficiently qualified and that, "In general, failures are due to emotional or motivational problems." It is of special significance that the correlation between measured ability and grade-point average he reported for his institution was .55 to .64.

The admissions officer of a women's college who did not know the correlation between test scores and college achievement at his college felt that only from 1 to 5 per cent were insufficiently qualified. He said, "We allow a handful of students—usually with alumni connections—to gamble on succeeding in college in the face of the prospects of failure indicated by the College Entrance Examination Board tests."

What does the questionnaire data and the other information presented all add up to? My answer, in one sentence, is that *many freshmen will continue to be enrolled in institutions where they are unlikely to be successful or most productive*. The major problem is heterogeneity of ability.

This diversity among students makes



Present personality assessment techniques cannot predict failures

it possible to predict fairly well that those who have low test scores will do unacceptable work despite their efforts and emotional suffering, and that those who have high test scores will do acceptable work without being challenged to really put forth their best. These students do not have an equal opportunity for success.

As I have pointed out,<sup>10</sup> high predictive correlation coefficients portray inequalities of opportunity for success which can be reduced or eliminated. Some admissions officers tell me that most of their applicants are qualified and that they turn down two qualified candidates for each one they accept. The high coefficients they report, however, make me doubt that all those who were admitted were really qual-

In my opinion, a student is qualified for a college if the achievement predicted for him is at the class average; if his predicted achievement is below average he is not qualified, and similarly if his predicted achievement is above average he is overqualified. If he is predicted to be below average or above average his needs can probably best be met by some other institution.

One thing that disturbs me about the plans for numerous junior and community colleges is that they will tend to enroll students who are very heterogeneous with respect to ability. Many able students will find these colleges so convenient they may miss a more challenging opportunity a little further away.

The formula which I believe gives

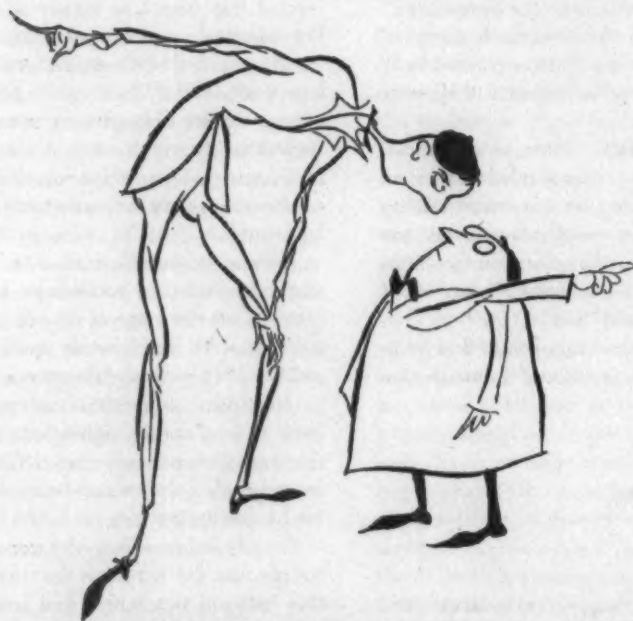
plicants who rank much below or above each institution's average college qualification rank should not be admitted.

Although I personally would like to see each college publicly and explicitly state what students it will and will not admit by use of the college qualification rank, my correspondence and conversations with admissions officers suggest that many institutions are unlikely to do this in the immediate future. But they might go part way. For example, a few of the major independent colleges in the country might state that they will admit all applicants who have a college qualification rank of 98 or higher, that they will not admit anyone with a rank less than 90, and that they would be willing to consider applicants with ranks between 90 and 97.

The major state university in each state might indicate that it will accept all applicants whose college qualification rank is 90 or higher, that it will not accept applicants whose rank is below 80, and that it will consider applicants whose rank is between 80 and 89. Certain of the junior or community colleges might state that they will accept applicants with a college qualification rank between 30 and 60, not accept applicants whose rank is below 20 or above 70, but that they will consider the remainder.

In other words, I believe that every college in the country, private and public, should practice selective admission in order to fulfil an important role in higher education. I think it is important for society and each individual that students have an opportunity for success at their ability level. Not all students are capable of "sputnik level" achievements, and the progress of those who are should not be retarded by those who can be educated to do other things satisfactorily for society and with satisfaction to themselves.

The above article is adapted from Dr. Fricke's paper, "Tests, Students, Standards, and Admissions Officers," presented in the symposium on the use of tests in admission to schools and colleges at the Twenty-second Educational Conference sponsored by the Educational Records Bureau and the American Council on Education and held in New York in October 1957. The paper will appear in the American Council on Education's forthcoming volume, *Long-Range Planning for Education*, edited by Arthur E. Traxler.



Colleges should differ in the kinds of freshmen they enroll

ified. That is, failure for some of the students can be predicted fairly accurately.

In a time when so much stress is being placed on optimum use of our human resources, improved methods for determining who is qualified for admission to a particular college should be used. The phrase, "qualified for college," as customarily used lacks meaning. An applicant may be qualified for one college but not for another, and he may be overqualified for another.

<sup>10</sup> *College and University*, op. cit.

the best assessment of a student's qualifications for college is obtained by giving a weight of one third to tested aptitude and of two thirds to rank in the high school graduating class. Very briefly, the "college qualification rank" of each applicant would be obtained by multiplying his high school percentile rank by two and adding this to his percentile rank on a scholastic aptitude test (where norms are established on a sample of all high school graduating seniors in the country); this sum divided by three would be the applicant's college qualification rank. Ap-

## The mounting costs of multiple application

Seventy member colleges of the College Board are each spending an average of 55 per cent more money on their admissions operations than they did six years ago.

In applying for admission to these colleges, students are spending an average of 110 per cent more in application fees than they did six years ago—yet on the average the net cost to the colleges of admitting and enrolling each freshman has increased, and at the same time the chances that “admitted” students will not enroll have increased.

As against six years ago, the following things are true of these 70 colleges:

1. They have 47 per cent more freshman applicants and are spending 11 per cent less money and 18 per cent less time on each individual applicant.

2. They are admitting 34 per cent more applicants but are enrolling only 20 per cent more freshmen.

3. They have increased tuition by 47 per cent but are granting financial aid to only 3 per cent more of the students in their freshman classes.

4. They are spending an average of 28 per cent more money and 12 per cent more time to fill a space in the freshman class.

5. They have increased their application fees by 42 per cent and have still experienced a 15 per cent increase in the net cost of filling a space in the freshman class.

These appear to be the most significant facts yielded by a questionnaire sent in June 1957 to the 185 colleges that were then members of the College Board. The survey sought information on admissions costs for review by the Board's proposed Commission on Entrance Procedures.

Responses were received from 111 of the 185 colleges. Of these, 70 colleges provided data relating to the freshman classes entering in 1951,

1956, and 1957; the other 41 colleges, for the classes entering in 1956 and 1957. Therefore, the 70-college group represents neither a cross section of all colleges in the United States nor even a random sample of all College Board member colleges. The financial information for this survey was sought not from college business officers but from admissions officers, who were encouraged to reply on the basis of figures which they had readily available or which they were willing to estimate.

The results suggest wide differences in admissions procedures and in the accounting for them (see Table 5). Nevertheless, there is evidence that the dollars-and-cents figures supplied are on the whole consistent enough within the College Board group and with the results of an independent survey in 1954 to be realistic (Tables 6 and 7).

The changes which they indicate not only appear to be reasonable gauges of what has happened over the last six years, but indicative of trends which provide rational bases for predicting what may happen in the future. Also, in order further to confirm the general

observations made above with regard to all 70 colleges, cost figures were compiled for subgroups of colleges according to number of freshmen enrolled, type (men's, women's, and co-educational), location, and amount of tuition. The different characteristics of these subgroups, of course, produced varying degrees of change over the six-year period. Almost without exception, however, the changes noted for the total group hold true in kind, though not necessarily in degree, for each of the subgroups.

As already noted, on the average these 70 colleges have 47% more applicants for each space in their freshman classes (Table 2, “application ratio” columns) and are spending 11% less money on each applicant (Table 3, “expenditure per applicant” columns) than they did six years ago. They had 237 applicants for every 100 spaces in 1951 and 350 in 1957; they spent \$43 on each applicant in 1951 and \$38 in 1957. That increased applications were accompanied by lower expenditures per applicant was generally true. However, in the larger colleges where vol-

Table 1. Summary admissions statistics at 70 Board member colleges

	1951	1957
Freshman class size as % of 1951 average	100%	120%
Tuition as % of 1951 average	100%	147%
Admissions expenditures as % of 1951 average	100%	155%
Admissions expenditures as % of college budgets (see Table 7)	1.93%	1.97%
Application fees	\$5.51	\$7.83
% of admissions expenditures recovered through fees (see Table 4)	15%	24%
Net cost per enrolled freshman (see Table 4)	\$75	\$86
Net cost per applicant	\$37	\$30
Expenditures per enrolled student (see Table 3)	\$88	\$113
Expenditures per applicant (see Table 3)	\$43	\$38
Man days per enrolled freshman	4.64	5.46
Man days per applicant	2.17	1.84
Application ratio (applied/enrolled) (see Table 2)	2.37:1	3.50:1
Applicant/admit ratio (applied/admitted) (see Table 2)	1.47:1	1.95:1
Fall-out ratio—all applicants (admitted/enrolled) (see Table 2)	1.61:1	1.80:1
Fall-out ratio—financial aid applicants	1.57:1	1.63:1
% of admitted applicants offered financial aid	20%	19%
% of enrolled freshmen given financial aid	20%	23%



ume efficiencies might have been expected to reduce expenditures per applicant, they actually went up.

Among the midwestern colleges, where increases in application load

have been relatively small, recruiting costs appear to have kept per applicant expenditures high. Among the high-tuition colleges, the expenditure per applicant has remained relatively stable

despite increases in applicant load.

On the average, these 70 colleges are admitting 34% more students, have 20% more spaces, and are spending 28% more dollars in the admissions process in order to fill each space (Table 3, "expenditure per enrolled freshman" columns). They spent \$88 to fill a space in 1951 and \$113 in 1957. Experiencing the greatest change were the colleges having the most applicants for each space (Table 2, "application ratio" columns)—that is, the men's and the high-tuition colleges. Experiencing the least change were the colleges (outside the Midwest) having the lowest applicant load—that is, the low-tuition colleges.

Location not being considered, the three subgroups spending the most to fill each space had to admit the most applicants to fill each space (Table 2, "fall-out ratio" columns). That is, the small, the women's, and the high-tuition colleges had the highest expenditures per enrolled freshman and the most severe "fall-out" problems. These relationships among the several dollar components which quantify admissions expenditures and the several statistical components which quantify the effects of the multiple application problem indicate a connection between the two sets. In plainer language, increased multiple applications result in larger expenditures by colleges.

Multiple applications have meant greater out-of-pocket costs to colleges, too, despite increased application fees (see Table 4). The average of application fees is up 42%, from \$5.51 to \$7.83; the average number of applicants for each space is up 47%, from 2.37 to 3.50; and colleges as a result are recovering 24% of the dollars spent in filling a space in the freshman class as against 15% six years ago. Yet the net or out-of-pocket cost of filling a single space is up 15%. Again, the greatest increase has occurred among the colleges having the highest application ratios (Table 2)—in other words, the colleges affected most by multiple applications; the one decrease has occurred in the case of the colleges which, regardless of location, are affected least by the multiple application problem.

Multiple applications are costing candidates more money than in 1951, too. Not only are they paying \$2.32 more on the average to each college in

**Table 2. Average application, fall-out and applicant/admit ratios at 70 Board member colleges**

	Application ratio <sup>1</sup>		Fall-out ratio <sup>2</sup>		Applicant/admit ratio <sup>3</sup>	
	1951	1957	1951	1957	1951	1957
70-college group—average	2.37	3.50 <sup>4</sup>	1.61	1.80 <sup>4</sup>	1.47	1.95 <sup>4</sup>
SIZE						
500 freshmen and over	2.42	3.27	1.61	1.74	1.50	1.88
under 500 freshmen	2.38	3.59	1.62	1.82	1.47	1.97
TYPE						
men's	2.73	4.23	1.62	1.80	1.69	2.35
women's	2.46	3.46	1.74	1.92	1.41	1.80
coeducational	2.07	2.99	1.51	1.70	1.37	1.76
LOCATION						
East	2.57	3.83	1.69	1.87	1.52	2.05
Midwest	1.88	2.24	1.52	1.59	1.24	1.41
other	2.06	3.31	1.44	1.69	1.43	1.96
TUITION						
\$925 and over	2.82	4.08	1.79	1.98	1.58	2.06
\$700 and under	2.01	2.81	1.45	1.67	1.39	1.68

<sup>1</sup> Application ratio represents the number of students who applied for admission to a particular college for every student who enrolled as a freshman. Thus, on the average for the freshman classes entering in 1957, three and one-half students applied for each space.

<sup>2</sup> Fall-out ratio represents the number of students who were "admitted" to a particular college in order to enroll one. Thus, on the average for the freshman classes entering in 1957, colleges had to admit one and eight-tenths students to fill each space.

<sup>3</sup> Applicant/admit ratio represents the number of students who applied to a particular college for every one who was admitted. Thus, on the average for the freshman classes entering in 1957, an applicant's chance of being admitted to a particular college was better than 1 in 2.

<sup>4</sup> These figures represent averages of per college ratios. In terms of the total number of students and spaces involved, the application ratio in 1957 would have been 3.22 (vs. 3.50), the fall-out ratio 1.67 (vs. 1.80), and the applicant/admit ratio 1.93 (vs. 1.95).

**Table 3. Average college expenditures per applicant and per enrolled freshman in 1951 and 1957 at 70 Board member colleges<sup>1</sup>**

	Expenditure per applicant			Expenditure per enrolled freshman		
	1951	1957	% Change	1951	1957	% Change
70-college group—average	\$43	\$38	-11.6%	\$ 88	\$113	+28.4%
70-college group—median <sup>1</sup>	32	29	- 9.4	80	109	+36.3
SIZE						
500 freshmen and over	25	29	+16.0	61	85	+39.3
under 500 freshmen	50	42	-16.0	99	125	+26.3
TYPE						
men's	32	28	-12.5	75	113	+51.1
women's	45	41	- 8.9	97	121	+24.7
coeducational	49	43	-12.2	89	106	+19.1
LOCATION						
East	37	33	-10.8	85	110	+29.4
Midwest	72	70	- 2.8	121	157	+29.7
other	39	31	-20.5	78	96	+23.1
TUITION						
\$925 and over	34	33	- 2.9	80	123	+53.7
\$700 and under	39	32	-17.9	77	84	+ 9.1

<sup>1</sup> All dollar figures are averages except the median figures given for the 70-college group.

**Table 4. Comparative expenditures and net costs per college on a per enrolled freshman base in 1951 and 1957 at 70 Board member colleges**

	1951				1957					
	Application fee income				Application fee income				6-Year Increase in net cost	
	Expendi- ture	Amount	As % of expendi- ture	Net cost	Expendi- ture	Amount <sup>1</sup>	As % of expendi- ture	Net cost	Dollars	Per cent
70-college group—average	\$ 88	\$13	15%	\$ 75	\$113	\$27	24%	\$ 86	\$11	15%
SIZE										
500 freshmen and over	61	8	13	53	85	23	27	62	9	17
under 500 freshmen	99	15	15	84	125	29	23	96	12	14
TYPE										
men's	75	10	13	65	113	28	25	85	20	31
women's	97	25	26	72	121	39	32	82	10	14
coeducational	89	7	8	82	106	18	17	88	6	7
LOCATION										
East	85	15	18	70	110	32	29	78	8	11
Midwest	121	8	7	113	157	15	10	142	29	26
other	78	12	15	66	96	24	25	72	6	9
TUITION										
\$925 and over	80	16	20	64	123	38	31	85	21	33
\$700 and under	77	9	12	68	84	20	24	64	-4	-6

<sup>1</sup>Amount of application fee income represents the product of application fee and application ratio. For example, in 1951 for the 70 colleges the average application fee was \$5.51 (Table 1) and the average application ratio was 2.37 (Table 2). Therefore, the amount of application fee income per space was \$5.51 times 2.37 or approximately \$13.

**Table 5. Distributions<sup>1</sup> of college expenditures per applicant and per enrolled freshman in 1951 and 1957 at 70 Board member colleges**

	Range of lower third of colleges	Lower limit, median, & upper limit of middle third of colleges	Range of upper third of colleges
Per applicant			
1951	\$4-25	\$25-32-43	\$43-178
1957	3-23	23-29-34	34-157
Per enrolled freshman			
1951	6-58	59- 80- 94	105-312
1957	6-73	74-109-138	138-298

<sup>1</sup>Distribution in thirds of the 70 colleges according to magnitude of per applicant and per enrolled freshman expenditures. For example, the 23 colleges having the lowest per applicant expenditures in 1951 ranged from \$4 to \$25 per applicant.

application fees but they are generating 3.50 applications for each space instead of 2.37. As a result of both the increase in fees and in applications, students in applying to the 70 colleges are paying over twice as much in application fees as they did six years ago—110 per cent more.

In return for their increased investment, however, applicants to these colleges face greater risk in acceptance by any one of them. Their chances of being admitted to any one college dropped from 68 out of 100 in 1951 to 51 out of 100 last fall (Table 2, "applicant/admit ratio" columns). And they of course faced the greatest risk in apply-

ing to the colleges at which they generated the most multiple applications.

The colleges also faced a greater financial risk, in terms of the chances that an admitted student would enroll (Table 2, "fall-out ratio" columns). Accurate prediction of enrollment is of the essence in the admissions process. Under-enrollment means empty spaces in the freshman class and lost tuition income. Over-enrollment means more freshmen than spaces and expense in excess of additional tuition income. The chances that an admitted student would enroll were 55.6 out of 100 last fall as against 62.1 out of 100 in 1951.

Recognizing Virgil's *varium et mutabile semper femina* as justification for a modern exception confirming this fickleness of woman, one notes that, except for women's colleges, the subgroups of colleges facing the above-average risk are those having above-average multiple applications, while those facing below-average risk have below-average application ratios. Hence, increased multiple applications also mean increased financial risk outside the admissions process itself.

As another type of subgroup, financial aid applicants to these 70 colleges continue to cost money in the admissions process but are generating only a slightly higher financial risk than they did six years ago—and an increasingly



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smaller one in relation to that being produced by their non-aid counterparts. The chances that an admitted financial aid applicant would enroll, which were 63.7 out of 100 in 1951, were still 61.4 out of 100 in 1957. Nevertheless, financial aid programs continue to generate high expenditures within the admissions process. The colleges with the most extensive aid pro-

grams tend to have the highest admissions costs; those with the least extensive programs, the lowest costs.

The colleges are nevertheless enrolling only 3% more of their freshman classes with financial aid than they did six years ago, 23% in 1957 against 20% in 1951, despite a 47% increase in tuition rates. However, over this period of time, the concept of awarding

aid on the basis of need has gained strength; 56 of the 70 colleges have become participants in the College Scholarship Service since its founding in 1954, and as a result financial aid dollars have been stretched to cover the considerably increased numbers of scholarship students among the 20% larger freshman classes. But recent announcements of further tuition increases for 1958 mean that financial aid dollars must be stretched still further, or new ones found, if competition for admission with financial aid is not to become even more severe and produce even more multiple applications among applicants with financial need.

In summary, the growth of the multiple application problem since 1951 has generated higher costs and greater risks for both applicants and colleges. The acceleration of this growth which is forecast for the years immediately ahead will inevitably produce either increases in costs to colleges and candidates or loss of effectiveness of the present process on the one hand or change in the process itself on the other.

If there is no change in the process, either costs and risks will become even higher or effectiveness will be lost. More specifically, if colleges do not become concerned and take no action, costs and risks to the colleges and the applicants will continue to increase.

If colleges become concerned over increasing expenditures and seek to recover larger portions of them through higher application fees, costs to applicants will skyrocket.

If colleges become concerned over expenditures and simply cut back admissions office budgets, they will reduce the amount of time and dollars spent on the individual applicant, substitute arbitrary criteria for real criteria in the selection of students, and reduce thereby the effectiveness of the present admissions process.

If, however, colleges become concerned but will not accept loss of effectiveness in the selection of students, then the process itself must be changed. The question is: Are the alternatives tolerable enough to live with for the foreseeable future without changing the admissions process, or are they so intolerable that remedies must be sought through changes in that process?

**Table 6. Average 1957 college expenditures per applicant and per enrolled freshman for 70-college and 111-college groups**

	Expenditure per applicant		Expenditure per enrolled freshman	
	70-college group	111-college group	70-college group	111-college group
Total group	\$38	\$37	\$113	\$106
SIZE				
500 freshmen and over	29	33	85	88
under 500 freshmen	42	40	125	114
TYPE				
men's	28	28	113	110
women's	41	38	121	105
coeducational	43	42	106	106
LOCATION				
East	33	31	110	100
Midwest	70	71	157	152
other	31	37	96	101
TUITION				
\$925 and over	33	32	123	123
\$700 and under	32	33	84	75

**Table 7. Admissions expenditures as per cent of total college budgets<sup>1</sup> in survey of Board colleges in 1951 and 1957 and in a study of 60 colleges in 1954<sup>2</sup>**

	College Board survey in				60-College study, 1954	
	1951		1957		Median	Average
	Median	Average	Median	Average		
Total group	1.7%	1.9%	1.6%	2.0%	2.0%	2.7%
SIZE						
large <sup>3</sup>	1.0	1.2	1.2	1.1	1.6	1.7
small <sup>4</sup>	1.9	2.3	1.8	2.3	.4	3.0
TYPE						
men's	1.4	1.4	1.7	1.9	2.4	2.7
women's	1.5	2.1	1.5	2.1	1.6	3.2
coeducational	1.7	2.2	1.8	2.1	1.9	2.4
LOCATION						
East	1.5	1.8	1.5	1.9	1.6	1.6
Midwest	2.9	2.9	2.9	2.9	3.6	4.9
other	1.7	2.0	1.5	2.0	.4	2.0

<sup>1</sup>"College budgets" represent "total annual income to the undergraduate college from all sources" for Board colleges and "all expenditures" in the 60-college study, wherein average total expenditures represented 97½% of average total income.

<sup>2</sup>"A Study of Income and Expenditures in Sixty Colleges, A Summary Report: Year 1953-1954" published under the direction of the National Federation of College and University Business Officers Associations.

<sup>3</sup>"Large" defined as colleges with 500 or more enrolled freshmen in 1957 for Board colleges and as colleges with enrollments of over 1,400 in 1954 in the 60-college study.

<sup>4</sup>"Small" defined as colleges with under 500 enrolled freshmen in 1957 for Board colleges and as colleges with enrollments of 1,400 and under in the 60-college study.

## College policy and the economy in the years ahead

**Tuition increases, extensive student loans, and expanded student enrollments are recommended for private colleges**

One cannot discuss college financial planning without reference to the current business climate and the prospect of a continued long-run expansion of our American economy. Our rapidly accelerating economic growth will have a major impact on all personal and institutional planning for the next several years. And in addition to this growth, we seem to be faced with a long-run inflationary trend which may influence college policies and programs more than any other single factor in our present society.

This concept, which forms the basis of my paper, was brought sharply to mind by the 1957 meeting of a conference series held at the Harvard Graduate School of Business Administration each year. The topic for the meeting this last June was "Management in a Rapidly Changing Economy," which might at first blush seem remote from the problems of college administrators. But the predictions and judgments of the business leaders, economists, and teachers of business administration who spoke at the conference have, in fact, significantly influenced my own thinking on plans and policies in my work at the Harvard Business School.

Therefore, I shall first describe briefly some of the major economic changes we can expect in the next several years. Then I shall propose

four major courses of action which I believe college and university administrators must take if they are to prepare their institutions for the financial problems of the 1960's.

Excluding the possibility of war or a major economic crisis, few long-range economic forecasters and business leaders seem to doubt that there will be a continuing rise in the standard of living in the United States. Even those who predict a "shakeout period" in the immediate years ahead speak of the "golden harvest of 1965." Our so-called middle-income group will continue to grow in numbers and size of income. Labor will press for additional wage increases and business will meet these demands by continuing to raise prices. There is little likelihood that the Federal Government will put real pressure on either group to halt inflation. Labor, business, and government in concert will act to increase average earnings, and together will produce thereby a continuing rise in the cost of living.

For more than 10 years now, Professor Sumner H. Slichter of the Harvard Graduate School of Public Administration has predicted a 2 to 3 per cent annual increase in prices. In a letter to the *Journal of Commerce* last February he said, "I believe that the price level will creep up fairly steadily and with only minor interruptions during the next 10 years, giving us by 1967 a price level roughly 20 to 30 per cent higher than the present one."

Family incomes have doubled within the past 10 years. Dr. Martin R. Gainsbrugh, the chief economist of the National Industrial Conference Board, points out that "the average wage-earning family today is in the \$5,000 to \$7,500 income group." It does not

seem absurd to suggest that by 1965 the average wage-earning family may be making between \$7,000 and \$9,500 a year.

The 1957 edition of "Giving U.S.A.," published by the American Association of Fund-Raising Counsel, reveals that 15.7 million families now have incomes between \$5,000 and \$10,000 annually, compared to 8.7 million families in 1950—almost a doubling in the number of families moving into the \$5,000 to \$10,000 bracket within the past seven years! Starting salaries for college graduates with engineering degrees averaged \$2,928 in 1947; this year they were \$5,196. According to a *New York Times* article in August, electrical engineers who completed their work at the Illinois Institute of Technology this year received annual starting salaries just under \$6,200. By 1965, college graduates with or without engineering degrees will be starting in business with salaries larger than those which full professors are earning today.

All of us have known only too well the impact of these developments on the educational institutions of the United States. Linked with other forces like population growth and increased demand for a college education, they are hammering away mercilessly on budgets in every area of our academic communities. Take salaries, for example: a 20 to 30 per cent increase in price levels within the next 10 years

This article is adapted from an address delivered at the Fifth Colloquium on College Admissions of the College Board, held last October. The address will be included in the Colloquium proceedings volume, *Planning College Policy for the Critical Decade Ahead; College Admissions 5*, which has been scheduled for spring publication by the College Board. It also appeared in the December 1957 issue of the *Association of American Colleges Bulletin*.





will put even greater pressure on college administrators to increase faculty salaries, which are already lagging far behind those in most other professions. *The Second Report to the President by the President's Committee on Education Beyond the High School*<sup>1</sup> revealed that in 1954 half of the college faculty members in this country earned less than \$5,400 annually. At the rates then prevailing, one out of two college teachers could aspire no higher than a lifetime maximum of \$7,000 per year, even if he should attain the rank of full professor.

The nation-wide average salaries of the highest rank of college teachers are about one-half the average income of all physicians. Median salaries of the academic profession (1953-54) even compare unfavorably with the lowest paid nonprofessional jobs in a typical major corporation. Foremen, for example, had median salaries in 1954 of \$7,600 per year; supervisors had median salaries of \$10,200.

The same report indicates that from 1940 to 1956 real income (measured in buying power after taxes) increased 29 per cent for lawyers, 64 per cent for industrial workers, 96 per cent for physicians, but only 12 per cent for college teachers as a whole. The modest increase for teachers was entirely in the lower ranks; full professors suffered a net decrease. Coupled with the need to expand greatly the number of faculty members in all educational institutions, the problem of increasing faculty salaries becomes almost staggering.

The costs of new construction, of improvements and alterations, of new equipment, of maintenance and services will continue to rise at the same time. In a *Fortune* magazine article entitled "Colleges Are Too Cheap," Herbert Solow estimated that in each of the next 10 years colleges and universities will require "in addition to income from established sources, annual new income of 608 million dollars for capital expansion and operations."<sup>2</sup> Mr. Solow also predicts: "Unless traditional practices are strikingly changed, the 1970 budget for instruction alone, with the student body doubled, will be

twice the present figure—in other words, somewhere around six billion dollars."<sup>3</sup>

Our recent experience at the Harvard Business School with a major capital gifts program illustrates the impact of inflation and expansion of activities on all educational institutions. In 1950 we set out to raise a sum of \$15,000,000. One of our objectives was to raise endowment income from around 12 per cent of our total annual income to 15 per cent. After many people devoted a great amount of effort to the campaign, the \$15,000,000 was raised in about three years. In the meantime, we discovered, our annual budget had continued to grow, so that the additional capital earmarked for endowment was merely enough to insure that our endowment funds would still provide 12 per cent of the annual income needed. In the words of former Dean Donald K. David, who carried the major burden of that campaign, "We ran our legs off just to keep pace with rising costs."

#### *Long-range planning essential*

America's rapidly growing and changing economy has put great pressure on business leaders to undertake long-range planning. Some corporations in this country have already divided responsibility at the top management levels into two major categories: current operations and long-range planning. Many business leaders today are devoting their efforts entirely to planning activities which will be set in motion long after they have retired or died.

Recognizing that the impact of economic changes in this country will strike educational institutions with just as great force as they will business organizations, several colleges and universities have set up similar planning committees of trustees, faculty members, and administrators. All are going to have to follow their example in the very near future. This is the first of my recommended courses of action.

I have already spoken about the pressures to raise faculty salaries and to increase substantially the size of the faculty at a time when all living

costs continue to mount—construction, services, equipment, and costs of auxiliary enterprises. Furthermore, gifts which are becoming more and more the "gift for current use" type cannot underwrite the costs of faculty expansion and faculty salary increases. Despite the optimistic picture of our national economy for 1965 and beyond, it would be folly for educational institutions to make lifetime commitments to a substantial number of new faculty members on the basis of current gifts.

As you know, Harvard University, despite an endowment of nearly half a billion dollars—larger than any other university in the United States—has found it necessary to undertake this year a campaign for \$82,500,000 for just one of its 11 units, the College. Even at that, the planners for the Harvard College campaign found it necessary to reduce some cost estimates and to eliminate projects to keep the campaign goal down to a figure which might be reached in the next two or three years.

But as the costs of college and university operations increase, we cannot look solely to current gifts and special fund-raising campaigns to keep ourselves solvent. As Professor Seymour Harris has argued, with many pages of convincing statistics, neither private philanthropy nor government can supply all the funds needed by education. I believe that it is absolutely essential for us to pass on a good-sized portion of the increase to the individual student. In the past 12 years, costs in colleges across the country have almost doubled. In 1947, the tuition plus medical fee at Harvard College was \$430; today it is \$1,060.

Colleges and universities have steadily increased their charges in the past decade, and I believe we must continue to raise the price tag on a college education. Incidentally, let no one doubt that our supporters in the business community expect us to do just that.

I am well aware that even the suggestion of increased tuition meets with resistance from admissions officers and directors of student financial aid. We all fear that our colleges and universities will price themselves out of the reach of lower and middle-income family groups. Let me suggest, how-

<sup>1</sup>(Washington, D.C.: United States Government Printing Office, July 1957).

<sup>2</sup>*Fortune*, September 1957, page 162.

<sup>3</sup>*Ibid.*





ever, that whenever you get squeamish about raising tuition or room and board rates, take a look at your parking lots filled with student cars or find out how much the average student spends on Christmas and Easter vacation trips. There is more money at all levels of our population than most of us realize. As I mentioned before, the average family now falls into the \$5,000 to \$7,500 earning bracket, and the number in the \$5,000 to \$10,000 category has doubled in the past seven years.

All of us are familiar with the case of a minister or widowed schoolteacher making \$2,800 to \$3,200 annually, who contributes substantially to the support of children in college. On the other hand, we all know of families with incomes of \$20,000 or more who permit their sons and daughters to apply for financial aid on the basis that they cannot help them with their educational expenses. It is about time that colleges and universities become

a little more hardheaded on this subject and insist that their "customers" put first things first. Are a second car, a house in a new neighborhood, or a vacation in Florida more important than a college education?

If we raise college tuition, will we really price out the boy or girl from a lower income family? Many colleges I know have loan funds which remain untapped year after year. Nowadays, more money than ever is available for scholarship help to the needy and able young man and woman. The National Merit Scholarship Plan, the General Motors Program, the Sears Foundation Merit Scholarships, and literally dozens of other corporate scholarship programs are providing an enormous amount of money. It will not be difficult to raise many more scholarship funds from corporations, which are obviously interested in a college-educated pool of talent. Alumni, too, can be counted on to respond to appeals for funds which will enable young men

and women to enjoy the same benefits of a college education that they had. Moreover, any raise in tuition would presumably include plans to earmark a portion of the increased revenue for scholarship funds.

As we work out ways to increase the reservoir of available scholarship funds, we should explore new approaches to the financing of a college education. Take credit buying, for example. Paying for goods and services on the installment plan is now generally accepted at all levels of our society. If trips to Europe can be purchased in this way, why cannot serious thought be given to charging students or their parents for college expenses with a long-run deferred payment arrangement?

Five years ago we established an experimental financial aid program at the Harvard Business School which might be generally described as a "deferred educational payment plan." Our program, which has operated very satisfactorily thus far, is designed primarily for students who will be embarking on business careers and obviously cannot be adopted as is by undergraduate colleges which prepare men for teaching, the ministry, and social work as well as for business. But this fact does not necessarily preclude experimentation with other types of deferred payment plans which have built-in exceptions for men and women who enter low-income professions.

I am convinced then that colleges must have the courage to raise their prices so that the costs of education do not run behind other living costs as they have been permitted to do in the past. If some of the leading educational institutions grasp this nettle and begin to raise tuition in a series of steps, other colleges and universities with less favorable admissions ratios and financial positions can follow without fear of losing students. It is up to the leaders to take the first steps.

But raising tuition will not do the job alone. Colleges will not be able to make ends meet without an accompanying cut in the costs of operation. Obviously, it is far easier to talk about cost reduction than it is to implement it. But there are ways.

For one thing, colleges typically have lagged behind business in adopting labor-saving equipment, not only

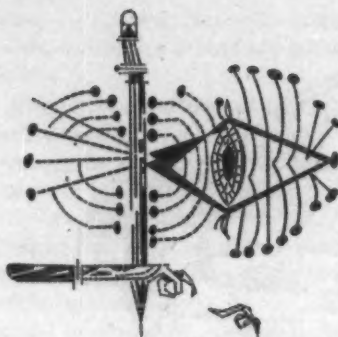
in their administrative offices but in all areas of activity. Furthermore, all of them will face the necessity of eliminating or reducing some services which they now provide to students, faculty members, and others. Needless to say, colleges have to perform this surgery with great care and discrimination. I am not suggesting, for example, that they sacrifice environmental benefits which are essential to the well-being and productiveness of the faculties, such as adequate secretarial help and quiet, comfortable, and well-maintained office space.

But most colleges have already shifted from maid service to self-service in dormitories without any bad side reactions. Few colleges can still afford several individual dining hall units on the campus; several have whittled away at other minor expenses by requiring students and faculty members to call for mail at a central office, by eliminating the storage of all but the most essential records, and by widespread use of mechanical devices—dictaphones, azographs, central telephone-answering services, and so on. Sometimes the individual savings are relatively minor, but when combined together in a carefully planned effort to reduce overall costs, they can significantly influence the institution's annual budget.

#### *Cutting admissions expenses*

Still another susceptible area is the college admissions office. All too often, I fear, this office is inclined to overlook certain extravagances because it is one of the so-called public relations arms of the institution. There are certain major expense items in all admissions budgets which are due for some tough-minded reviewing. Even those functions which now seem essential to the admissions operation might well be looked at with a critical eye and a sharp pencil.

Is it necessary, for example, that each admissions folder be reviewed by an entire admissions board? Cannot folders be reviewed and voted on independently by two or three individual admissions officers? At Northwestern University, discussion by the Board is devoted only to those few applications on which there is disagreement among individual voters.



And what about candidate interviewing? When the Harvard Business School discovered that a substantial portion of its \$61,000 budget was spent on personal interviews with every applicant for admission, an evaluation of this time-consuming procedure was launched.<sup>4</sup> On the basis of the results of the evaluation, we did away with the compulsory interview requirement on an experimental basis. This experiment is in its third year and so far we have seen no difference in the classes we have been admitting.

We shall continue our experiments with admissions interviews, perhaps modifying our present position to some extent. But one thing is already clear to us—requiring personal interviews is expensive, both to the school and to the applicants for admission. We have come to the conclusion that we need clear evidence, which we have been unable to find, to justify reinstating the interview requirement as a part of our admissions program. To me, this experience has been an eye-opener. From my experience working in two other university admissions offices—at the undergraduate level—plus my activities at the Harvard Business School, I firmly believed that an admissions office could not select a high-quality class without interviews. I am now ready to admit that my subjective view on interviews could not be supported by evidence. As a result of this experience, I feel constrained to look at other “sacred cows” in our various operations to see whether they, too, can be justified in terms of costs.

Finally, colleges should look at their objectives. What kind of institution do

they wish to have by 1965? Should they devote their major efforts to pioneering in new programs and new ideas which other institutions can follow? Shall they place major emphasis on faculty research? Should they invest the resources of their college into the preparation of teachers for other institutions? What role are they best qualified to play in the next several years?

One of the most important questions in determining objectives concerns size. A *U.S. News and World Report* survey last June revealed that of 76 private colleges queried, 18 have determined that they will not expand, and nine, that they will grow less than 10 per cent. Some of these positions were taken after the college president, his board, and key faculty members and administrators carefully analyzed their present role, made realistic projections about the type of institution they wish to have in 1965, and considered carefully the mounting pressures from alumni, the community, and the nation which they will have to face.

On the other hand, some of these size policies have apparently been set without a full exploration of the consequences. For the past three years, Robert W. Merry, professor of business administration at Harvard, and I have conducted one-week institutes for college presidents in which the participants study, analyze, and discuss problems actually faced by other college presidents.

One of the problem cases describes a hypothetical small college whose president and board have determined that they will not allow their institution to grow beyond its present size. It has been something of a revelation to discover the kinds of questions some of the presidents present at the institutes had explored or, more importantly, *had not* explored before publicly avowing that their small institutions, too, will not be allowed to grow beyond their present size.

When queried, few of these presidents could stand up to such questions as: What evidence is there that quality is a factor of size? Would you rather have your son or daughter sit in the classroom 100 feet away from a world-renowned professor or 10 feet away from a mediocre one? By closing off all possibility of growth now, are you

<sup>4</sup>See Lewis B. Ward, “The Interview as an Assessment Technique,” *College Admissions* 2 (New York: College Entrance Examination Board, 1955), pages 62-71.



not discounting all future experimentation and new ventures in education—for example, the selection and segregation of gifted students; new teaching techniques which balance closed-circuit television classes with discussion-type sessions; and new academic calendars which would stagger classroom work, independent study off campus, and vacation time between *two* full student bodies?

### *Strategic size policy*

It should go almost without saying that a major policy statement setting forth objectives on this matter of size will affect the attitudes of alumni, members of the local community, business leaders, and the general public. Such pronouncements, moreover, can—though not necessarily will—affect future fundraising activities of the institution. Alumni of high-quality institutions will usually be enthusiastic about efforts to keep standards high and the college small and intimate. Will the individual alumnus feel as happy about this policy when his own son or daughter is denied admission? Will he continue to give generously to the alumni fund? What happens when more and more alumni, year after year, receive disappointing news from the admissions office?

At the present time, the major sources of support for private colleges and universities are alumni, business corporations, foundations, citizens in local communities, and a few other non-alumni friends. But this combination is not in automatic balance, for alumni support is becoming the keystone in the structure. For example, more and more business leaders and foundation executives seem inclined to look at the amount of support given an institution by its alumni as an indication of the dynamic quality of the college's program. James C. Worthy, vice president of Sears, Roebuck, and Company, said in a speech before the American Management Association in January: "Some companies are paying particular attention to the efforts the schools are making to strengthen the support of their alumni. If those with the closest personal ties to a school, those who have benefited most from what it has to offer, are supporting it in only a lukewarm or halfhearted

fashion, why should business be expected to assume a major part of the burden?"

The Corporate Alumnus Program, which was introduced by the General Electric Company three years ago, has been adopted by 38 other major corporations. In addition, at least six or eight other corporations are currently developing programs to match gifts of employees. These programs will continue to increase in number because they are easy to administer. Furthermore, they relieve corporation executives from the burden of singling out individual institutions from the more than 1,800 colleges and universities in need of help. As a result, the gifts of alumni will play an increasingly important role in determining the amount of corporate support the college or university will receive.

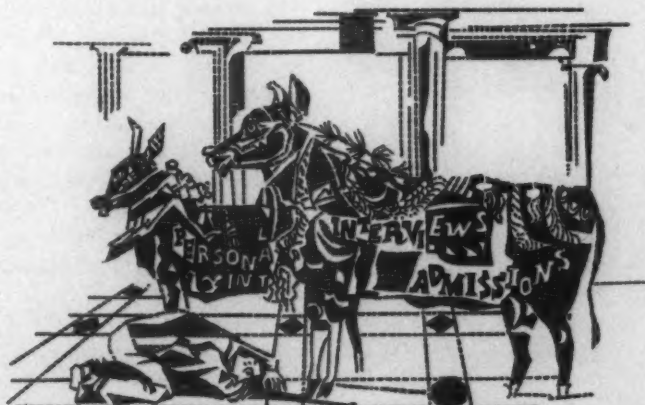
In making plans to secure corporate support in the years ahead, colleges should take into account the kinds of pressures which are being brought to bear on business leaders. The rapidly growing universities will argue that they deserve a major slice of corporate gifts because they are turning out 8,000 to 10,000 engineers, business administrators, and other specialists, while the smaller colleges are graduating from 100 to 400 seniors, many of whom will go on to graduate professional schools and not into business.

In addition, many of these rapidly growing institutions are located side by side with major corporations. We are all familiar with the expanding urban university that has attracted extraordinarily large support from business corporations and influential citizens with the argument that they were developing a resource for growing numbers of students and adults in the

local area. The efforts of these more aggressive institutions will become increasingly difficult for small institutions to match if the businessmen and community leaders who influence corporate giving are not fully convinced that the men and women who attend the private colleges that have been kept small are truly broader or better thinkers than their contemporaries from large schools.

If colleges decide to resist the pressure to expand, they must be aware that they are giving up one of their major arguments for business and community support. Growth charts, which reveal in graphic form that an ever-increasing number of young men and women, business executives, and other adults in the community are benefiting from the resources of an educational institution, make a strong impression on the potential giver. Growth and expanding services give evidence to most business leaders that an institution is dynamic. If colleges are determined to stay small, they must ask themselves what there is that is dynamic about their institution. What makes their institution so unique that the alumnus whose son or daughter is turned down will continue to support it with his dollars and his influence in the community? They must be certain that the quality they are endeavoring to maintain is indeed quality. They must be able to measure the effectiveness of their educational program and prove that their standards are higher, the students they are preparing are receiving a better education than they would elsewhere, and their contributions to the community and the nation are significant.

In probing the fundamental issues of this matter of growth, colleges might





well be helped to sounder answers by conversations with those whose orientation is different from theirs. Not too many of us are willing to put some of our most cherished ideas about education and the development of young people to the test of arguing them out with individuals who hold sharply opposing views. Last spring, I heard a dean from a well-known eastern institution remark, "I prefer to bat my problems around with the other deans in the Ivy League rather than attend those meetings where all types of people are represented."

There are many arguments and generalizations about types of education and about the size and climate of educational institutions which persons in the profession use and understand. But do the businessmen, the legislators, the general public, and even the institution's own alumni understand their arguments?

How would they reply to the businessman who asks, for example, "Why do you need more buildings at this time when you operate your physical plant only eight or nine months a year and for less than half a day, at that? I operate my plant 24 hours a day, six days a week, and maintenance men service the equipment on the seventh."

Notice that he hasn't said a word about stretching *faculty* resources beyond their present utilization. Any arguments about the traditional academic calendar may fall on deaf ears, particularly when this businessman has seen other institutions undertake dynamic new programs without any apparent sacrifice in quality. Furthermore, are colleges really faced with an inherent conflict between quality and quantity?

Out of such discussions can come new ideas, like the "study-plus-work"

programs which allow a college to accommodate two full-sized student bodies without increasing their physical facilities. Antioch College not only has such a system, but permits students to spend one of their five years studying abroad. This has allowed the college to expand its size by an additional 20 per cent without affecting the size of the faculty or campus facilities.

### *Colleges pool resources*

Certain colleges and universities of California, already well experienced in the problems of a rapidly growing population and economy, have taken some unique steps which are well worth our consideration. The Associated Colleges of Claremont—Claremont Men's College, Claremont Graduate School, Pomona College, Scripps College, and the recently created Harvey Mudd College—share such facilities as a library with over a quarter of a million volumes, an excellently equipped science building, medical facilities, an auditorium seating more than 2,500 people, and joint business offices. Each college can remain small with its own distinct personality and yet share in the advantages of larger universities.

Another interesting development has been the expansion of the University of California system. My California friends tell me that few top-flight students in the state were interested in attending Santa Barbara State College until it became the eighth campus of the University of California. It would not be surprising if, in 1965, several major private universities had taken over as "wholly owned subsidiaries" some smaller institutions which at the present time are carrying other names.

Colleges and universities with unique ideas on how to meet the needs of our expanding population without diluting the quality of their educational programs will attract alumni, corporate, foundation, and community support. As their resources grow through such support and as their tuition income increases from expanding student bodies, these colleges and universities will be in a position to attract the strongest faculty members in the United States—not only because of their salary scales but because of their vitality. Faculty members with vigor and imagination demand a creative institutional cli-

mate, one characterized by experimental programs, constant re-examination of activities, and imaginative, courageous planning.

But the question of size, with all its ramifications, is only one of the elements in a pattern of objectives. How much should be done to meet the desire of more and more adults for the resources of our institutions? Ought colleges to provide a "continuous educational voyage" for their alumni? Should they participate in overseas programs, and if so, to what extent? One of the most vital responsibilities of college administrators is to think through questions like these, and the summary I have just given of the problem of size and various solutions for it is an example of the appraising process that must be undertaken within each of these areas of objectives.

Unfortunately, however, setting the objectives is not the end of the line. For one thing, colleges have to convince their alumni, business friends, and the general public that they are sound and worthy of support. This, in itself, is a major educational effort!

But more important, colleges have to remember the kind of society in which they live—and here I come back full circle to the point where I started. Our society is changing fast, and will continue to do so. The objectives which are sound today will be outdated tomorrow. Thus, like the long-range planning in business, the setting of college purposes must be a continuing effort. As President John Dickey once said, "The vitality of an institution can be measured by the constant refinement and development of its objectives. If they ever become crystallized and set, you can be sure that organizational *rigor mortis* is setting in."

We must all be aware that what is unique at any one institution now may not be at all unique in 1965. What is considered a high-quality institution in 1957 can be one that has lost much ground to others by 1965.

For all those in education, the years immediately ahead provide a magnificent opportunity to test well-worn educational traditions, to venture out into bold new experiments, and to demonstrate to the American people the vital character of their institutions. I have no doubt that they will meet this challenge.



Vernon R. Alden is associate dean of the Graduate School of Business Administration of Harvard University.

- ✓Adelphi College
- ✓Agnes Scott College
- ✓Albertus Magnus College\*
- ✓Alfred University
- ✓Allegheny College
- American International College
- ✓Amherst College
- ✓Annhurst College\*
- ✓Antioch College
- ✓Bard College
- ✓Barnard College
- ✓Bates College
- ✓Beaver College
- ✓Beloit College
- ✓Bennington College
- Boston College
- ✓Boston University
- ✓Bowdoin College
- ✓Brandeis University
- ✓Brown University
- ✓Bryn Mawr College
- ✓Bucknell University\*
- Caldwell College\*
- ✓California Institute of Technology
- ✓Carleton College\*
- ✓Carnegie Institute of Technology
- Catholic University of America\*
- ✓Cedar Crest College
- ✓Centre College of Kentucky
- ✓Chatham College
- ✓Chestnut Hill College\*
- ✓Claremont Men's College
- ✓Clark University (Mass.)
- ✓Clarkson College of Technology
- ✓Colby College
- ✓Colgate University
- ✓College of Mount Saint Vincent\*
- College of New Rochelle\*
- ✓College of Notre Dame of Maryland\*
- College of Saint Elizabeth\*
- College of Saint Rose\*
- College of the Holy Cross
- College of William and Mary
- ✓College of Wooster
- ✓Colorado College\*
- ✓Columbia College (N.Y.)
- ✓Connecticut College
- Cooper Union
- ✓Cornell University
- ✓Dartmouth College
- ✓Davidson College\*
- ✓Denison University
- DePauw University
- ✓Dickinson College
- ✓Douglass College
- Drew University
- Duke University
- ✓Dunbarton College of Holy Cross\*
- D'Youville College\*
- Elmira College\*
- ✓Emmanuel College
- ✓Emory University
- ✓Fordham College\*
- ✓Franklin and Marshall College\*
- ✓Furman University

- Georgetown University
- George Washington University
- Georgia Institute of Technology
- ✓Georgian Court College\*
- ✓Gettysburg College
- ✓Goucher College
- ✓Grinnell College
- ✓Hamilton College
- Hampden-Sydney College
- ✓Harvard College
- ✓Haverford College
- ✓Hobart College and William Smith College\*
- ✓Hollins College
- Hood College\*
- ✓Immaculata College\*
- Immaculate Heart College\*
- ✓Iona College
- ✓Jackson College for Women
- Kalamazoo College
- ✓Kenyon College
- ✓Keuka College
- ✓Knox College
- ✓Lafayette College\*
- ✓Lake Erie College
- ✓Lake Forest College
- La Salle College
- ✓Lawrence College\*
- ✓Lehigh University
- ✓Lewis and Clark College
- ✓Manhattan College
- ✓Manhattanville College of the Sacred Heart
- ✓Mary Baldwin College
- ✓Marymount College (N.Y.)\*
- ✓Marywood College\*
- ✓Massachusetts Institute of Technology
- McGill University
- Mercer University
- ✓Michigan State University\*
- ✓Middlebury College\*
- ✓Mills College
- Moravian College\*
- ✓Mount Holyoke College
- ✓Muhlenberg College
- ✓Muskingum College
- Nazareth College (N.Y.)
- Newark College of Engineering\*
- ✓Newcomb College of Tulane University\*
- ✓Newton College of the Sacred Heart
- ✓New York University
- ✓Northeastern University
- ✓Northwestern University
- ✓Notre Dame College of Staten Island\*
- ✓Occidental College
- ✓Ohio Wesleyan University
- ✓Pembroke College in Brown University
- Pennsylvania State University
- ✓Pomona College
- ✓Princeton University
- Providence College
- Queens College (N.C.)
- ✓Radcliffe College

## College Board member colleges

Check (✓) indicates participants in the College Scholarship Service. Dot (•) indicates subscribers to the May 21 Candidates Reply Date Agreement for 1958 (see page 1). An asterisk (\*) following a college's name means it does not include scholarship applicants under the Candidates Reply Date Agreement.

- ✓Randolph-Macon
- Woman's College
- ✓Reed College
- ✓Regis College (Mass.)
- ✓Rensselaer Polytechnic Institute
- Rice Institute
- ✓Rollins College
- ✓Rosemont College\*
- Russell Sage College\*
- ✓Rutgers, The State University of New Jersey
- ✓Saint Joseph College (Conn.)\*
- ✓Saint Joseph College (Md.)\*
- Saint Joseph's College (Pa.)\*
- St. Joseph's College for Women\*
- ✓St. Lawrence University
- ✓Saint Mary's College (Ind.)\*
- Salem College (N.C.)\*
- ✓Sarah Lawrence College
- ✓Scripps College
- Seton Hill College\*
- Shorter College (Ga.)
- ✓Simmons College
- ✓Skidmore College
- ✓Smith College
- Southwestern at Memphis
- ✓Stanford University
- ✓Stevens Institute of Technology
- ✓Swarthmore College
- ✓Sweet Briar College
- ✓Syracuse University
- Thiel College
- ✓Trinity College (Conn.)
- Trinity College (Wash., D.C.)\*
- ✓Tufts College of Tufts University
- ✓Tulane University\*
- ✓Union College (N.Y.)\*
- United States Air Force Academy
- United States Merchant Marine Academy
- United States Military Academy
- United States Naval Academy
- University of California
- ✓University of Chicago
- University of Colorado
- University of Connecticut
- University of Denver\*
- University of Georgia
- ✓University of Massachusetts
- ✓University of Michigan
- University of Notre Dame
- ✓University of Pennsylvania
- ✓University of Redlands
- University of Rhode Island\*
- ✓University of Rochester
- University of San Francisco\*
- ✓University of Southern California
- ✓University of the South\*
- University of Vermont
- University of Virginia
- ✓Urainus College\*
- Valparaiso University
- ✓Vassar College
- Villanova University\*
- Wabash College
- ✓Wagner Lutheran College
- ✓Washington and Jefferson College
- ✓Washington and Lee University\*
- ✓Wellesley College
- ✓Wells College
- ✓Wesleyan University
- ✓Western College for Women
- ✓Western Reserve University
- ✓Wheaton College (Mass.)
- ✓Wheelock College\*
- ✓Whitman College
- ✓Whittier College
- ✓Williams College
- ✓Wilson College
- Worcester Polytechnic Institute
- Yale University
- Yeshiva University

## Non-member colleges participating in CSS

- Bradford Junior College
- Case Institute of Technology
- Colby Junior College
- College of Puget Sound
- Hofstra College
- Illinois College
- Illinois Wesleyan University
- John Carroll University
- Juniata College
- La Verne College
- Monmouth College
- National College of Education
- Oberlin College
- Pfeiffer College
- Polytechnic Institute of Brooklyn
- Pratt Institute
- Rhode Island School of Design
- St. John's College (Md.)
- St. Joseph's College (Ind.)
- Stetson University
- Transylvania College
- University of New Hampshire
- University of Pittsburgh
- Upsala College
- Vanderbilt University
- Wake Forest College
- Westminster College (Pa.)
- Willamette University
- William Jewell College
- Wilmington College (Ohio)



## NEWS OF THE COLLEGE SCHOLARSHIP SERVICE

### Volume rise continues

**Up sharply in the West:** Through January, the College Scholarship Service had received confidential statement forms from 20,604 parents, 16 per cent more than by the same time last year.

Over the same period, transcript volume for the 11 western states increased by almost 75 per cent, with 2,919 parents in those states filing forms as against a corresponding 1,293 for last year. These 2,919 parents constituted 10.9 per cent of the 20,604 nation-wide total. Copies of the financial statement form made and sent by the CSS are used by colleges to adjust the size of financial aid awards according to the applicant's need.

Participation in the Service also increased since fall, the addition of four colleges bringing the total number of participants to 175 by mid-February (see list, page 33). Participating colleges require all their scholarship applicants to fill out and file a copy of the form with the CSS.

### To repeat consolidated report

**Shows other college offers:** For the second time since its inception four years ago, the CSS will issue a "consolidated report" to each participating college. On the consolidated report are listed the college's financial aid applicants and all offers and awards made them by other participating colleges. The reports enable colleges to compare their financial aid policies with those of other colleges.

It is anticipated that the second reports, which will cover 1957-58, will list only applicants that the college has in common with other participants. The first consolidated reports, covering 1955-56, listed all the college's scholarship applicants.

Data for the second reports will be gathered on forms which the CSS plans to issue in August. The resulting consolidations are expected to be distributed next winter.

Last year, for which no consolidated reports were prepared, the CSS gave

participants copies of an "inter-college tender and award report form" on which the college could list the applicants it had in common with another participant and request directly from the other college information on offers and awards the college had made to those applicants.

### Instruct 40 in computation

**Actual cases studied:** Representatives from each of some 40 colleges, a few of them faculty members of scholarship committees and most of them admissions or scholarship officers of recent standing, attended the two-day "computation school" introduced by the CSS in December.

Held in Princeton, New Jersey, the school program offered as its main features an explanation of the standard procedures for computing financial need from data given on the parent's form and practice in applying the procedures in 25 cases. These were cases of actual scholarship applicants drawn from CSS files to illustrate a typical range of need determination problems.

Five CSS Committee or staff members served as instructors in the program, which included a tour of the CSS operations office at the Educational Testing Service in Princeton.

**Juries weigh stock holdings:** Having helped develop standard procedures for determining need in the previously

troublesome cases of farmers and small businessmen, CSS computation "juries" now meeting weekly in Princeton seem to be confronted most often with cases involving the value of stock owned by a father in a business of which he is also the head.

Other types of cases that are frequently being referred to the juries this year are those of early forced retirement of the father through illness and of recent unemployment of a healthy though aging father.

Scholarship officers at participating colleges serve on the juries on a voluntary basis. This year's jury sessions, which convene Thursday evenings and continue through Friday, will be held through April 18.

Volunteers are welcome and service is recommended as valuable experience to college officers who either do their own computations or review computations estimates purchased from the Service. Cases not amenable to solution by standard procedures are held for jury consideration by the CSS computation service.

### Set meeting for October 28

**To precede Board meeting:** In a departure from past practice, the CSS Committee has scheduled the next annual meeting of CSS college representatives for October 28, 1958, the day before the fall meeting of the College Board. Past CSS meetings have been on the day following the Board's fall meeting. To be held in New York City, the CSS meeting will have both morning and afternoon sessions and will include a buffet luncheon.

In another recent action, the CSS Committee established a subcommittee on scholarship practices under the chairmanship of Ben F. Cameron, Jr., admissions director at the University of the South. The new subcommittee will investigate the possibility of devising a code of scholarship practice to which all participating colleges could subscribe. Continuing subcommittees are those on computation, operations, and research.



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